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# Satisfaction with Amenities and Taste for Revolt in the Middle East

## Abstract

The purpose of this study is to explore the relationship between individuals' satisfaction with amenities and environmental quality and taste for revolt in the Middle East. Using recent World Value Survey data (WVS7, 2017-2021) from Egypt and Iraq (which have been experiencing severe environmental degradation and inadequate and mismanagement of public infrastructure) and applying Probit regressions, our results show that satisfaction with amenities and environmental quality indicators are negatively and statistically related to individuals' inclination towards revolt in both countries. This finding is more pronounced in urban areas, particularly in large cities. We also find that individuals' satisfaction with amenities and environmental quality affect the taste of revolt through the individual's life satisfaction and satisfaction with the government's provision of utilities. The analysis for Egypt suggests that satisfaction with public transportation systems, roads and highways, air quality, and housing quality are significantly and negatively associated with support for revolutionary action. For the Iraq sample, we find that dissatisfaction with roads and highways, water quality, school quality, and the physical settings of cities lead to a higher probability of support for uprising.

JEL-Codes: D740, H540, Q530.

Keywords: amenities, air quality, Middle East, environment, pollution, revolution, satisfaction.

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## **1. Introduction**

The purpose of this research is to investigate the relationship between individuals' satisfaction with amenities and environmental quality indicators and their preference for revolt in two Middle Eastern countries, Egypt and Iraq. These countries have experienced several social uprisings and revolutions over the past century (e.g., The Egyptian Revolution of 1919; The Egyptian Revolution of 1952; The Egyptian "bread riots" of 1977; The 2011 Egyptian revolution; The 1920 Iraqi Revolt; The 1935–1936 Iraqi Shia revolts; The 1958 Iraqi coup d'état). The latest one was the "Arab Spring" experienced by several Arab countries in 2011. During and after the "Arab Spring," several researchers and political commentators have attempted to explain the determinants of individuals' support for revolution in these countries. For example, Ianchovichina et al. (2015) and Verme et al. (2014) argue that individual perceptions of worsening living standards, poor public services, and the lack of government accountability played important roles in shaping people's preferences for revolutionary action (Maimone Ansaldo Patti et al., 2021).

While existing conceptual studies provide valuable insights on the determinants of uprisings in Arab countries, there is a lack of empirical work on individuals' inclination towards revolts in the Middle East region using recent data. In this study, we focus on a specific determinant of people's preferences for radical change: satisfaction with amenities and environmental quality. Specifically, we attempt to understand whether the taste for revolt is lower (higher) for individuals who are more satisfied (dissatisfied) with public services (such as healthcare, the physical beauty of cities, transportation systems, and schools), environmental quality (air and water quality), and housing quality.

Environmental degradation, especially air and water pollution, as well as inadequate and mismanaged public infrastructure, have been key challenges for most Middle Eastern and North African (MENA) countries over the past decades. In a recent report by the World Bank, Heger et al. (2022) provide evidence that living standards, including incomes, human capital, and infrastructure, have improved in MENA countries over the past three decades, but at significant costs to natural capital deterioration. They show that emissions, marine pollution, ocean acidification, and water stress due to unsustainable water management have increased. Additionally, terrestrial and marine ecosystems have deteriorated and natural habitats have been destroyed. The average urban resident in the MENA region breathes air that exceeds safe levels of pollutants by more than ten times. In the MENA region, ambient air pollution (AAP)

costs the average citizen at least sixty days of sickness over their lifespan and caused 270,000 premature deaths in 2019. In terms of economic costs, the environmental degradation of the skies and seas is estimated to cost more than 3% of the gross domestic product (GDP) in some of the region's economies. For example, the annual cost of AAP is more than 3% of the GDP in Egypt (Heger et al., 2022). In addition to economic and health costs, environmental degradation, especially due to water shortages and excessive water pollution, have caused violent and non-violent protests in some MENA countries, such as Iraq (Human Rights Watch, 2019) and Egypt (Climate Diplomacy, 2022).

The recent individual-level survey data collected by the World Value Survey Wave 7 (WVS7) from Egypt and Iraq in 2018 make it possible to explore the link between citizen satisfaction with amenities, environmental quality, and preference for revolution. In WVS7, there are specific questions for the Middle Eastern countries that measure the respondents' level of satisfaction with public and social services, living environment, and quality of housing. These questions were not asked in other countries. The survey also measures preference for revolutionary action.

Controlling for other drivers of the taste for revolt and applying Probit regressions, we find evidence that individuals who have a higher level of satisfaction with amenities and environmental quality are less likely to support revolutionary action in Egypt and Iraq. This is more apparent in urban areas and large cities than in rural and small cities. Further analysis for Egypt suggests that satisfaction with the public transportation systems and the quality of air and housing has a robust and negative relationship with support for revolutionary action. For the Iraq sample, we find that dissatisfaction with the roads and highways, the quality of water and schools, as well as the physical setting of cities, lead to a higher probability of individuals supporting uprisings.

Our study contributes to the literature in three ways. First, while several studies have examined the impact of aggregate economic and political variables (e.g., income inequality, GDP per capita, growth in GDP, type of government in power, civil, economic, and political freedom) as well as individual socioeconomic characteristics (including gender, age, income, marital status, education, and religiosity) on support for radical change (e.g., François et al., 2021; MacCulloch, 2003; MacCulloch, 2004; MacCulloch, 2005; MacCulloch & Pezzini, 2007; MacCulloch & Pezzini, 2010; Maimone Ansaldo Patti et al., 2021), to the best of our knowledge, no empirical research has examined the link between individual satisfaction with amenities, environmental quality, and taste for revolt using recent data. Second, the present

study provides insights into differences between resource-dependent economies (Iraq) and non-resource-dependent economies (Egypt) in terms of the determinants of individuals' preference for revolutionary action. Third, our paper contributes to the literature on the effect of satisfaction with amenities and environmental quality on various social and behavioral variables. While Nakamura and Managi (2020), Liu et al. (2020), Kotakorpi and Laamanen (2008), and others have examined the impact of amenity quality (and/or satisfaction with amenities) on life satisfaction, internal conflicts, protests, marital stability, aggressive and violent disputes, investigation into the link between different types of amenities and environmental quality indicators and individuals' taste for revolt has received relatively little attention from existing studies. We address these gaps in the literature.

Understanding citizens' taste for revolt is crucial to anticipate/prevent revolution/uprising in two major economies in the Middle East region, given their geopolitical location and importance in the global energy markets. As shown by Maimone Ansaldo Patti et al. (2021) and MacCulloch and Pezzini (2010), there is a strong correlation between individual taste for revolt and different types of violence in various countries.

The article proceeds as follows: Section 2 reviews the relevant studies and develops the research hypothesis. Section 3 describes the data, variables, and estimation method. The results are presented and discussed in Section 4. Section 5 concludes the paper.

## **2. Review of literature**

### ***2.1. Prior literature on determinants of individuals' taste for revolt***

These studies examine the impact of various socio-economic and demographic characteristics, as well as aggregate economic and political variables, on individuals' preference for revolutionary action. It is important to note that our focus is on people's inclination towards revolutionary action rather than on actual episodes of internal conflict. Therefore, we only review the determinants of individuals' support for revolutionary action, and not the determinants of intrastate war or internal conflicts.

Using individual-level data from 12 European countries between 1976 and 1990, MacCulloch (2003) found that the probability of supporting revolt was higher among males, the unemployed, those with low income, and younger people. He also demonstrated that being married, religious, and having right-wing political ideology reduced the chance of having revolutionary tendencies. His Probit regressions also indicated that a decrease in the level of

GDP per capita, more income inequality, and a right-wing government in power were associated with a stronger preference for radical action.

In a subsequent study, MacCulloch (2004) showed that the probability of supporting revolt was significantly lower in countries with a higher level of GDP per capita and among individuals with higher income. Controlling for a set of personal characteristics and country and year fixed effects, MacCulloch (2005) found that lower levels of personal income and greater income inequality (measured by the Gini coefficient) had a positive and significant effect on increasing the chance that an individual supports revolt. His results also indicated that employed, female, married or widowed, and older individuals were less likely to support revolutionary actions. MacCulloch and Pezzini (2007), using survey data from 61 countries between 1981 and 1997, showed that individuals' income and religiosity, as well as economic growth, reduced revolutionary support. In a subsequent study, MacCulloch and Pezzini (2010), using a similar data set, found that higher levels of freedom (including civil liberties and democratic freedoms), higher economic growth, higher levels of international trade, and religiosity have negative and significant effects on individuals' revolutionary support. Regarding freedom, Maimone Ansaldo Patti et al. (2021) provided evidence that individuals with less subjective freedom and living in more fragmented countries (more diverse societies) are more inclined towards revolts, by using WVS individual-level data collected from 51 countries between 1990 and 2003. Their results also indicated that freedom could moderate the impact of social diversity on individuals' preferences for revolutionary action. They also found that economic and political freedom negatively affect individual preferences for revolutionary action. François et al. (2021) showed that majority rule, periodic elections, and power-sharing institutions in democratic systems decreased revolutionary attitudes.

There are also a number of studies before the 2000s that, to some extent, focus on the same topic but with different terms for "taste of revolt". For example, in their analysis of the political economy of attitudes towards polity and society in Western European countries between 1976 and 1986, Clarke et al. (1993) found that personal life satisfaction, democracy satisfaction, unemployment rate, and inflation rates were significant determinants of individual demand for radical social change. Using West Germany data, Finkel and Muller (1998) showed that "individuals participate in collective protest when they are dissatisfied with the current provision of public or collective goods, when they believe that group actions can be successful, and when they believe that their own participation is important for group success." Their

analyses also suggest that private incentives (e.g., financial gain) do not have a significant impact on protest behavior.

## ***2.2. The impact of satisfaction with amenity and environmental quality on individuals' quality of life***

The other strand of literature closely related to our work is the relationship between satisfaction with amenities, environmental quality, and individuals' life satisfaction (or happiness, subjective well-being, and quality of life)<sup>1</sup>. The majority of these studies have shown that well-developed public services, higher environmental quality, and favorable climatic factors improve citizens' mental wellbeing and life satisfaction.

For example, using large-scale survey data from municipalities in Japan, Nakamura and Managi (2020) found that citizens' satisfaction with overall municipal services has a positive impact on life satisfaction. They also showed that social aspects (e.g., adequate quality of housing, adequacy of education services) of municipal services have a stronger impact on life satisfaction than economic (e.g., tax revenues) and environmental (e.g., quality of air and water) aspects. Likewise, Liu et al. (2020) showed that efficient delivery of public services (e.g., public health, public transport, public education) leads to high individual life satisfaction in Shandong province of China. Kotakorpi and Laamanen (2008) used WVS data collected in 2000 and found that devoting more resources to public health care services has a positive impact on the life satisfaction of Finnish citizens. They also showed that the welfare benefit of public expenditures on healthcare depends on individual political orientation and income level.

Regarding environmental quality and quality of life, Silva et al. (2012) found that a higher level of air pollution (measured in terms of PM10 concentrations) has a negative impact on individuals' satisfaction with air quality, which leads to a lower level of subjective well-being in both OECD and non-OECD countries. MacKerron and Mourato (2013) showed that individuals in the UK are significantly and substantially happier when outdoors in all green or natural habitat types than they are in urban environments. They provide three reasons for the positive link between the experiences of natural environments and happiness: (1) exposure to natural environments affects the nervous system, reducing stress and restoring attention (Wilson, 1993, p.31), (2) noise and air pollution are higher in urban areas (than in natural environments) and have adverse impacts on physical health (e.g., Gouveia & Maisonet, 2005;

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<sup>1</sup> We use these terms interchangeably.



Passchier-Vermeer & Passchier, 2000), which, in turn, reduces an individual's happiness, and (3) experiences of natural environments may increase life satisfaction by facilitating and encouraging behaviors that are physically and mentally beneficial, including physical exercise, recreation, and social interaction (Barton & Pretty, 2010; Morris, 2003).

In a similar study, MacKerron and Mourato (2009) showed that both perceived and measured air pollution levels are significantly negatively associated with the life satisfaction of survey respondents in London. The relationship between environmental quality, climatic factors, and life satisfaction has also been found in Australia (Carroll et al., 2009), the Netherlands (van Praag & Baarsma, 2005), Ireland (Brereton et al., 2008), Germany (Luechinger, 2009) and across countries (Rehdanz & Maddison, 2005; Welsch, 2006; Rehdanz & Maddison, 2008). Brereton et al. (2008) provide evidence that amenities such as climate, environmental, and urban conditions (e.g., wind speed, temperature, access to major transport routes, and proximity to the coast and waste facilities) are important determinants of an individual's life satisfaction in Ireland.

Ambrey and Fleming (2014) found that higher levels of public greenspace are associated with higher levels of welfare for residents of Australia's capital cities. Using data from Guangzhou, China, Su et al. (2022) showed that an increase in temperature during the winter, lower noise levels, and lower PM<sub>2.5</sub> can improve individuals' momentary happiness. Winters and Li (2017) also found that higher temperatures in winters have a significant positive impact on self-reported life-satisfaction in the US.

In terms of housing, using data from the 2006 Chinese General Social Survey, Zhang et al. (2018) showed that housing satisfaction and homeownership are significant determinants of people's overall life satisfaction in urban China. Zebardast and Nooraie (2018) also found that satisfaction with housing, including space and quality, is positively related to indicators of quality of life in Iran. This positive association is also observed in other studies, such as Lee and Park (2010) and Gür et al. (2020)<sup>2</sup>.

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<sup>2</sup> For a review of existing studies in this area, see Gür et al. (2020). For a theoretical explanation of the link between community amenities, environmental conditions, and life satisfaction, see Campbell et al. (1976), Marans (2003), and van Kamp et al. (2003).

### ***2.3. Satisfaction with amenity & environmental quality and individuals' taste for revolt***

In this section, we conceptualize the link between satisfaction with amenity & environmental quality and individuals' preference for revolt in Egypt and Iraq and then develop our hypotheses.

In section 2.2, we show that efficient public services, housing quality, environmental quality, and favorable climatic factors enhance the subjective well-being of citizens. However, the reduction in life satisfaction caused by a polluted environment, inefficient public services, and poor quality of housing is not the end of the story in the majority of MENA countries, where the citizens of most of these countries are among the angriest people in the world (Gallup, 2020).

According to Gallup (2020), the top six countries in terms of people's anger are Iraq, Turkey, Lebanon, Egypt, Tunisia, and Iran. In these countries, dissatisfaction with amenities and environmental quality can easily turn into anger and aggression, which often leads to violent and hostile behavior. For example, Feizi et al. (2019) showed that rainfall shortage and precipitation scarcity had a significant impact on violent conflicts and tensions across provinces in Iran over the period of 2007-2014. They argued that this is because "water is a resource with no replacement and consistent, and instant need. The struggle to get access to its scarce resource might lead people to show non-cooperative, and even hostile and violent behaviors." In addition, "precipitation deficiency might give an income shock, make people nervous, and make them violent" (p. 890-91)<sup>3</sup>. Ianchovichina et al. (2015) and Verme et al. (2014) also noted that the outburst of popular anger in the MENA region during the "Arab Spring" was rooted in individual perceptions of falling living standards, poor public services, and the lack of government accountability (Maimone Ansaldo Patti et al., 2021).

We hypothesize that citizens living in environments where public services are perceived as undesirable and inefficient and the quality of air, water, and housing is unsatisfactory may feel frustrated and are likely to be less satisfied with their lives, which, in turn, can lead to higher

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<sup>3</sup> There is a strand of literature that tests "the heat hypothesis," which states that "hot temperatures increase aggressive motivation and (under some conditions) aggressive behavior" (Anderson, 2001, p.33). Anderson (2001, p.36) argues that "Heat-induced discomfort makes people cranky. It increases hostile affect (e.g., feelings of anger), which in turn primes aggressive thoughts, attitudes, preparatory behaviors (e.g., fist clenching), and behavioral scripts (such as "retaliation" scripts)." This positive link has mainly been explained by the "crankiness" notion which is based on well-established theories in social psychology (cognitive neo-association theory (Berkowitz, 1984), excitation transfer theory (Zillmann, 1983), and general affective aggression model (Anderson et al., 2000)).

levels of anger (Coccia, 2018<sup>4</sup>) and a preference for radical change in government. This is, to some extent, in line with the view that preferences for revolt stem from a sense of grievance associated with feelings of social injustice, unfairness, or exploitation of a group of people (MacCulloch & Pezzini, 2007; Hirshleifer, 1995)<sup>5</sup>. MacCulloch (2004) also argued that individuals' feelings of extreme frustration (and discontent) positively contribute to the decision to participate in mass rebellious actions. Similarly, Finkel and Muller (1998) showed that dissatisfaction with public or collective goods is one of the key determinants of individuals' participation in collective protest. Kassinove (2012) also argued that anger plays a useful part in social movements, for example, for equality for Black people, the elderly, and women. Gurr (1971) noted that the failure to gain the expected benefits from modernization by particular groups in society can lead to frustration and revolt.

Based on the above discussion, our general hypothesis is:

**Hypothesis:** Individuals at higher levels of dissatisfaction with amenities and environmental quality indicators tend to support more radical change in societies, *ceteris paribus*.

### **3. Data and Methodology**

#### **3.1. Data**

To test our hypotheses, we rely on unique survey data collected by the WVS Wave 7 in Egypt and Iraq (Haerper et al., 2022). The survey questionnaire included specific questions that were only asked of respondents from a number of Middle Eastern countries. The survey responses were collected from 1,200 Egyptians and 1,200 Iraqis in 2018.

The Egyptian Research and Training Center (ERTC) conducted the 7th wave of the World Values Survey in Egypt, while the Independent Institute & Administration Civil Society Studies (IIACSS) conducted it in Iraq. The fieldwork took place from May to July 2018 in both countries. The target population was the adult civilian population (aged 18 years or older) living in urban and rural areas.<sup>6</sup>

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<sup>4</sup> Coccia (2018) shows that unhappiness can lead to higher level of anger and frustration which can lead to aggressive behavior and violent crimes.

<sup>5</sup> Another view on individuals' preference for revolution is because of expected monetary gains for the victors (MacCulloch & Pezzini, 2007).

<sup>6</sup> For more details about the sample design and data collection process in both countries, see WVS7 Sample Design Egypt 2018 & WVS7 Sample Design Iraq 2018 at <https://www.worldvaluessurvey.org/WVSDocumentationWV7.jsp>

It should be noted that the WVS data has been widely accepted and used by several political and economic researchers over the past four decades (e.g., Gollin et al., 2021; Farzanegan & Gholipour, 2021).

These two countries were selected for analysis not only due to data availability but also for their geopolitical location and importance in the global energy markets. Iraq's oil export revenues as a share of the total oil export revenues of the Organization of the Petroleum Exporting Countries (OPEC) have increased from 5% in 2010 to 7.7% in 2021. Approximately 10% of global proven crude oil reserves and about 17% of Middle Eastern crude oil proved reserves are in Iraq (OPEC, 2023).

Egypt has a strategic position in the Middle East, operating the Suez Canal and the Suez-Mediterranean Pipeline, which are important to the transportation infrastructure of international energy markets (EIA, 2022). Egypt is also the most populous country in the MENA region, while Iraq is the fifth largest (World Bank, 2023). Any major political changes in these countries may have contagion effects on other countries in the region, which was seen during the Arab Spring.

### ***Dependent variable***

The dependent variable in our study is individuals' support for revolutionary action. In the "Social Values, Attitudes; Stereotypes" section of the WVS Wave 7 survey, there is a question that asks respondents about their attitudes towards the society they live in. Specifically, respondents are asked:

"On this card, there are three basic kinds of attitudes concerning the society we live in. Please choose the one which best describes your own opinion. (Please code only one option from the list below):

- 1. The entire way our society is organized must be radically changed by revolutionary action*
- 2. Our society must be gradually improved by reforms*
- 3. Our present society must be valiantly defended against all subversive forces."*

Following MacCulloch (2004), the dependent variable in our study is a binary variable that equals 1 if the respondent agrees that "The entire way our society is organized must be radically changed by revolutionary action" and 0 otherwise. For the regression analyses, we removed 66 cases from the Egypt sample because they either had missing or multiple answers or responded

as "don't know." There were no missing or multiple answers or "don't know" responses for the Iraq sample. We followed the same procedures with other variables. Table 1 presents the descriptive statistics for all variables.

### ***Explanatory variable of interest: Satisfaction with amenities and environmental quality***

In the Middle East regional module, the WVS7 includes a question regarding individuals' satisfaction with amenities and environmental quality. The question asks respondents, "In the city or area where you live, are you satisfied or dissatisfied with the quality of the following?" The items listed are public transportation systems, roads and highways, schools, air quality, water quality, healthcare quality, housing quality, beauty of construction, and beauty of physical setting. Respondents are asked to choose from the options of (1) very satisfied, (2) fairly satisfied, (3) fairly dissatisfied, and (4) very dissatisfied. To facilitate the interpretation of the measure, scores have been reversed (1: very dissatisfied... 4: very satisfied). It should be noted that the Egypt sample does not include the question on the "beauty of construction," but includes a question about the "public transportation systems." The Iraq sample, on the other hand, does not include the question on "public transportation systems," but includes the "beauty of construction" in the WVS7 questionnaire.

In addition to the indicators mentioned above, we also compute the averages of all satisfaction indicators, amenity-related variables, and environmental quality indicators. For the average of satisfaction with amenity-related indicators, we use all indicators except for satisfaction with the quality of air and water, which are used for calculating the average of environmental quality indicators.

We include satisfaction with amenities and environmental quality indicators separately in the regressions, as there is a significant correlation between some of them. For example, in the case of Egypt, the correlation coefficient between schools and the quality of healthcare is 0.60 ( $p < 0.05$ ). In the Iraq sample, the correlation coefficient between the quality of housing and the beauty of the physical setting of the city is 0.50 ( $p < 0.05$ ).

### ***Control variables***

In addition to the variables of interest, namely satisfaction with amenities and environmental quality, we also include other important determinants of individuals' support for revolution in

our estimations. Our selection of control variables is primarily based on the works of MacCulloch (2003), MacCulloch (2004), MacCulloch (2005), MacCulloch and Pezzini (2007), MacCulloch and Pezzini (2010), and Maimone Ansaldo Patti (2021). However, unlike these studies, we do not incorporate aggregate-level variables (e.g., GDP per capita, income inequality, political freedom) into the model, as our study focuses on individuals within a country. We also consider the availability of data for variables in the WVS when selecting control variables for the model specification. It is important to note that our primary results on the variables of interest remain statistically significant regardless of the inclusion of certain control variables. The following is an outline of the control variables.

*Age:* According to MacCulloch and Pezzini (2007, 2010), the probability of older people supporting radical changes in society is significantly lower. Additionally, Farzanegan and Witthuhn (2017) have shown that the youth bulge is a key driver of political instability in the presence of higher corruption across countries. For the age variable, we use the respondents' self-reported age. The survey question reads, "This means you are --- years old."

*Gender:* Our control for gender is a dummy variable equal to 1 if the respondent is male and 0 if the respondent is female. We expect that male respondents will support revolutionary action more than female respondents, as shown by MacCulloch (2003) and MacCulloch and Pezzini (2010). This expectation may also be in line with the extremely robust result that women are more risk-averse than men found in some studies, such as Charness and Gneezy (2012).

*Income scale:* The question on the WVS survey reads: "On this card is an income scale on which 1 indicates the lowest income group, and 10 indicates the highest income group in your country. We would like to know in what group your household is. Please specify the appropriate number, counting all wages, salaries, pensions, and other incomes that come in." Our expectation is that higher-income groups in society may not support radical changes in societies due to the risk of undermining their higher economic interests if national security is threatened (Farzanegan & Gholipour, 2021). In their cross-country analyses, MacCulloch and Pezzini (2007) provide empirical evidence that economic growth at the macro-level and each individual's income ranking within their country play important roles in shaping preferences for revolution in countries.

*Marital status:* We created a dummy variable for marital status: 1 if married and 0 otherwise (e.g., single, divorced, separated, widowed). It is expected that married people are

less likely to want a revolution compared to other groups (MacCulloch, 2004; MacCulloch & Pezzini, 2007). This is also in line with findings which show that married individuals are more risk-averse (Browne et al., 2022).

*Tertiary education:* We generate a dummy variable equal to 1 if a respondent has tertiary education (Short-cycle tertiary education, Bachelor or equivalent, Master or equivalent, and Doctoral or equivalent); 0 otherwise (Early childhood education/no education, Primary education, Lower secondary education, Upper secondary education, and Post-secondary non-tertiary education). Higher education increases the opportunity costs of significant political actions, such as revolution. Additionally, the dampening effect of higher education on the demand for revolution could be in line with Jung (2015), who shows evidence of a positive causal effect of education on risk aversion.

*Employment status:* We generate four dummy variables for employment status (Full-time employee, Part-time employee, Self-employed, and Unemployed) and use other groups (Retired/pensioned, Housewife, Student; others) as a base in our regression analyses. We expect that individuals with more stable employment status tend to support less revolutionary solutions for the challenges.

*Number of children:* A number of studies on the determinants of the taste for revolt include the number of children as an explanatory variable in their model (e.g., MacCulloch, 2003; MacCulloch, 2004). We also consider the respondent's number of children as a control variable. The survey question is: "Do you have any children? (Code 0 if no, and the respective number if yes)."

*Religiosity:* Some studies have considered the level of religiosity as an explanatory variable for support for revolutionary action (e.g., MacCulloch, 2003). We utilize the following question in the WV survey to measure the level of respondents' religiosity: "Independently of whether you attend religious services or not, would you say you are...?" The possible answers are "1. A religious person," "2. Not a religious person," and "3. An atheist." We assign a dummy variable to 1 for "1. A religious person" and 0 otherwise.

*Political action:* One may argue that people who have taken some form of political action may believe in political reforms, and therefore tend to support less radical changes in societies. We use the WVS question "... I'm going to read out some forms of political action that people can take, and I'd like you to tell me, for each one, whether you have done any of these things, whether you might do it, or would never under any circumstances do it: Signing

a petition, Joining in boycotts, Attending peaceful demonstrations, and Joining strikes.” We generate the *Political action* variable by summing affirmative responses for the above four dummy variables. For example, if a respondent answers affirmatively to two actions, then that respondent’s score would be 2. If someone does not partake in any political action, he or she would take a value of 0.

*Subjective freedom:* MacCulloch and Pezzini (2010) show that a lack of freedom (at the country level) results in greater support for rebellion. In this study, instead of using aggregate-level freedom scores, we focus on individuals’ perceptions about their freedom, given that our analyses are conducted within a country. To measure this variable, we use a question from the WVS which asks respondents whether they feel they have completely free choices and control over their lives. The question in the survey reads: “Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means 'no choice at all' and 10 means 'a great deal of choice' to indicate how much freedom of choice and control you feel you have over the way your life turns out (code one number).”

*Preference for income equality:* MacCulloch (2005) provides strong evidence of the positive impact of income inequality (measured by the Gini Index at the country level) on people's support for revolutionary action. Unlike MacCulloch (2005), we use individuals’ preferences for income equality in society. We expect that respondents who prefer more income equality will tend to support revolutionary action. We use the following question in the survey: “... How would you place your views on this scale? 1 means you agree completely with the statement on the left; 10 means you agree completely with the statement on the right; and if your views fall somewhere in between, you can choose any number in between. (Code one number for each issue)”; the values ranged from (1) Incomes should be made more equal to (10) There should be greater incentives for individual effort. We reversed this question, meaning that 1 would indicate a tendency toward income equality.



**Table 1. Descriptive statistics (after polishing the data)**

<i>Variables</i>	<b>Egypt</b>				<b>Iraq</b>			
	<i>Frequency (%)</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Obs.</i>	<i>Frequency (%)</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Obs.</i>
<b>Support for revolutionary action</b>	24.07%			1,134	20.25%			1,200
<b>Satisfaction with amenities and environmental quality indicators</b>								
The public transportation systems		2.32	.85	1,185		na	na	na
The roads and highways		2.37	.86	1,192		2.15	1.04	1,197
The schools		2.21	.85	1,177		2.20	.98	1,195
The quality of air		2.59	.88	1,192		2.21	1.006	1,193
The quality of water		2.28	.96	1,193		2.06	.98	1,195
The quality of health care		1.94	.86	1,195		1.93	.930	1,195
The quality of housing		2.53	.88	1,197		2.26		1,193
Beauty construction		na	na	na		2.22	1.00	1,192
The beauty of physical setting of city		2.30	.82	1,195		2.23	1.02	1,191
Average of amenities and environmental quality indicators		2.32	.65	1,165		2.16	.73	1,180
Average of amenities		2.282	.653	1,167		2.174	.763	1,182
Average of environmental quality indicators		2.438	.830	1,191		2.141	.887	1,193
<b>Age</b>		39.69	13.44	1,200		36.60	13.40	1,200
<b>Sex (male=1)</b>	51.75%			1200	50.67%			1200
<b>Income scales (1=lowest income group; 10 highest income group)</b>		4.99	1.39	1,114		4.45	1.82	1,200
<b>Marital status (married=1)</b>	69.42%			1200	72.08%			1200
<b>Education (Tertiary education=1)</b>	21%			1200	25.90			1,197
<b>Employment status (base group: Retired/pensioned, Housewife, Student &amp; Others)</b>				1,199				
Full time employee	27.44%				22.77%			
Part time employee	12.68%				8.24%			
Self employed	9.67%				12.49%			
Unemployed	4.59%				10.28%			
<b>Number of children</b>		2.17	1.65	1,200		2.43	2.23	1200
<b>Religious person</b>	73.60%			1,125	76.72%			1,121
<b>Political actions</b>		.12	.43	1,161		.39	.82	1,122
<b>Free choice and control over lives (1-10 scale)</b>		6.53	2.25	1,177		6.78	2.29	1,200
<b>Believe in income equality (1-10 scale)</b>		4.25	2.99	1,192		6.27	3.14	1200

Note: “na” indicates that this question was not asked of the survey respondents in the country.

### 3.2. Estimation method

Given that the dependent variable of this study is binary, with values of 0 and 1, we apply the Probit regression following MacCulloch (2005) and MacCulloch and Pezzini (2007) with robust standard errors that correct the standard errors for heteroscedasticity.

The regression model estimated is as follows:

$$\text{Support of Revolution}_i = \alpha + b \text{ Satisfaction}_i + c \text{ Control} + \varepsilon_i \quad (1)$$

Here, the dependent variable is *Support of Revolution*, which takes a value of 1 when respondent *i* believes that "The entire way our society is organized must be radically changed by revolutionary action." Satisfaction represents the key explanatory variables of interest, such as satisfaction with amenities and environmental quality indicators. Control represents the control variables and  $\varepsilon$  is an error term.

## 4. Results

### 4.1 Main analyses

Tables 2 and 3 present the results of the Probit regressions for Egypt and Iraq, respectively. The results show that Egyptian respondents with higher levels of satisfaction with public transportation systems, roads and highways, air quality, and housing quality have a lower tendency towards revolutionary action. The coefficients of these four indicators are negative and statistically significant in columns 1, 2, 4, and 7 of Table 2. Additionally, the estimation results indicate that the other four indicators of satisfaction with amenities and environmental quality have the expected negative signs but are insignificant at conventional levels (see columns 3, 5, 6, and 9 of Table 2). The average of nine indicators in column 10 of Table 2 is negatively and significantly associated with support for revolutionary action in Egypt. In general, these findings support our hypothesis that satisfaction with amenities and environmental quality plays an important role in shaping people's preferences for revolutionary action in Egypt.

The regression results also show that the preference for revolutionary action is higher among Egyptian respondents with lower income, university education, and lower religiosity (see columns 1-10 of Table 2). Additionally, we discovered that those who place a greater value on income equality tend to have a stronger inclination towards revolution. Lastly, the results from the Egypt sample imply that individuals who perceive more freedom in their life have a lower

probability of supporting revolutionary action. Age, gender, marital status, employment status, number of children, and political actions are not significant determinants of respondents' preference for revolution (refer to columns 1-10 of Table 2).

**Table 2. Results of Probit regressions for Egypt (full sample)**

	Dependent variable: Support for revolutionary action											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<b>Satisfaction with amenities and environmental quality indicators</b>												
The public transportation systems	<b>-.108**</b> (.055)											
The roads and highways		<b>-.109**</b> (.054)										
The schools			-.036 (.055)									
The quality of air				<b>-.119**</b> (.054)								
The quality of water					-.072 (.047)							
The quality of health care						-.074 (.052)						
The quality of housing							<b>-.103*</b> (.053)					
Beauty construction								na				
The beauty of physical setting of city									-.029 (.058)			
Average of amenities and environmental quality indicators										<b>-.151**</b> (.068)		
Average of amenities												<b>-.134*</b> (.069)
Average of environmental quality indicators												<b>-.117**</b> (.054)
<b>Age</b>	-.002 (.004)	-.002 (.004)	-.001 (.004)	-.002 (.004)	-.002 (.004)	-.002 (.004)	-.002 (.004)	-.002 (.004)	-.002 (.004)	-.001 (.004)	-.001 (.004)	-.002 (.004)
<b>Sex (male=1)</b>	.117 (.132)	.104 (.132)	.119 (.133)	.130 (.134)	.119 (.133)	.116 (.133)	.108 (.133)	.114 (.133)	.129 (.134)	.121 (.134)	.121 (.134)	.127 (.134)
<b>Income scales (1=lowest income group; 10 highest income group)</b>	-.101*** (.038)	-.102*** (.038)	-.109*** (.038)	-.106*** (.038)	-.106*** (.038)	-.109*** (.038)	-.104*** (.038)	-.109*** (.038)	-.102*** (.038)	-.103*** (.038)	-.103*** (.038)	-.106*** (.038)
<b>Marital status (married=1)</b>	-.026 (.119)	-.034 (.119)	-.055 (.120)	-.028 (.119)	-.029 (.118)	-.034 (.119)	-.022 (.119)	-.036 (.119)	-.045 (.121)	-.047 (.121)	-.047 (.121)	-.047 (.121)
<b>Education (Tertiary education=1)</b>	.239** (.121)	.232* (.122)	.249** (.121)	.239** (.121)	.245** (.121)	.248** (.121)	.243** (.121)	.250** (.121)	.239** (.122)	.241** (.122)	.241** (.122)	.241** (.122)
<b>Employment status (base group: Retired/pensioned, Housewife, Student &amp; Others)</b>												
Full time employee	-.039 (.146)	-.013 (.146)	-.023 (.147)	-.040 (.148)	-.027 (.148)	-.015 (.148)	-.021 (.147)	-.018 (.147)	-.048 (.149)	-.038 (.148)	-.038 (.148)	-.038 (.148)
Part time employee	.046 (.182)	.064 (.181)	.062 (.182)	.037 (.184)	.043 (.182)	.062 (.182)	.050 (.183)	.050 (.182)	.052 (.184)	.060 (.183)	.060 (.183)	.060 (.183)
Self employed	-.174 (.196)	-.150 (.194)	-.144 (.196)	-.171 (.197)	-.162 (.195)	-.153 (.195)	-.162 (.194)	-.147 (.195)	-.183 (.196)	-.173 (.196)	-.173 (.196)	-.173 (.196)
Unemployed	-.294 (.257)	-.277 (.257)	-.245 (.259)	-.288 (.254)	-.281 (.256)	-.291 (.254)	-.280 (.254)	-.267 (.257)	-.264 (.257)	-.258 (.258)	-.258 (.258)	-.258 (.258)
<b>Number of children</b>	.024 (.037)	.024 (.037)	.034 (.037)	.029 (.037)	.025 (.037)	.026 (.037)	.025 (.037)	.026 (.037)	.031 (.037)	.031 (.037)	.031 (.037)	.031 (.037)
<b>Religious person</b>	-.249** (.106)	-.237** (.106)	-.248** (.107)	-.230** (.106)	-.238** (.105)	-.244** (.106)	-.234** (.106)	-.247** (.106)	-.249** (.107)	-.251** (.107)	-.251** (.107)	-.251** (.107)
<b>Political actions</b>	-.095 (.122)	-.097 (.121)	-.085 (.123)	-.099 (.122)	-.086 (.124)	-.085 (.123)	-.084 (.122)	-.087 (.123)	-.084 (.122)	-.083 (.122)	-.083 (.122)	-.083 (.122)
<b>Free choice and control over lives (1-10 scale)</b>	-.105*** (.022)	-.108*** (.022)	-.111*** (.022)	-.104*** (.022)	-.107*** (.022)	-.107*** (.022)	-.105*** (.021)	-.110*** (.022)	-.105*** (.022)	-.106*** (.022)	-.106*** (.022)	-.106*** (.022)
<b>Believe in income equality (1-10 scale)</b>	.063*** (.016)	.062*** (.016)	.062*** (.016)	.062*** (.016)	.062*** (.016)	.064*** (.016)	.063*** (.016)	.063*** (.016)	.062*** (.016)	.063*** (.016)	.063*** (.016)	.063*** (.016)
Constant	.481* (.287)	.502* (.291)	.361 (.294)	.551* (.286)	.422 (.285)	.405 (.287)	.502* (.290)	.356 (.292)	.571* (.299)	.540* (.301)	.540* (.301)	.540* (.301)
Number of observations	963	968	959	967	967	966	968	968	951	952	952	952
Wald chi2	76.41	79.55	72.38	77.37	72.73	73.29	74.64	72.47	76.88	76.36	76.36	76.36

Note: Robust standard errors in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01. "na" indicates that this question was not asked of the survey respondents in the country.

For the full Iraq sample, similar to the results in Egypt, we observe that the coefficient of amenities and the average score of environmental quality are negatively and significantly associated with support for revolutionary action (see column 10 of Table 3). We also find that the taste for revolt is significantly lower among Iraqi respondents who are more satisfied with the roads and highways, schools, quality of water, and physical setting of cities in Iraq (see columns 2, 3, 5, 8, and 9 of Table 3).

Regarding the control variables, the results of Probit regressions indicate that individuals with higher levels of income have less tendency toward revolutionary action (see columns 1-10 of Table 3). Part-time employees have more of a taste for revolt compared to the base group (retired/pensioned, housewives, and students). Other socio-economic characteristics of respondents are not significantly related to support for revolutionary action in Iraq.

**Table 3.** Results of Probit regressions for Iraq (full sample)

	Dependent variable: Support for revolutionary action											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<b>Satisfaction with amenities and environmental quality indicators</b>												
The public transportation systems	na											
The roads and highways		<b>-0.099**</b> (.043)										
The schools			<b>-0.095**</b> (.044)									
The quality of air				-0.039 (.044)								
The quality of water					<b>-0.120***</b> (.046)							
The quality of health care						-0.057 (.046)						
The quality of housing							-0.065 (.045)					
Beauty construction								<b>-0.088*</b> (.046)				
The beauty of physical setting of city									<b>-0.091**</b> (.046)			
Average of amenities and environmental quality indicators										<b>-0.154**</b> (.061)		
Average of amenities											<b>-0.147**</b> (.059)	
Average of environmental quality indicators												<b>-0.095*</b> (.050)
<b>Age</b>	-0.0009 (.003)	-0.0009 (.003)	-0.0007 (.003)	-0.0007 (.003)	-0.0007 (.003)	-0.0009 (.003)	-0.0007 (.003)	-0.0006 (.003)	-0.001 (.003)	-0.0005 (.003)	-0.0008 (.003)	-0.0005 (.003)
<b>Sex (male=1)</b>	.007 (.118)	.002 (.116)	.001 (.116)	.006 (.118)	.011 (.117)	.007 (.117)	.003 (.118)	.014 (.118)	-.019 (.118)	-.002 (.118)	-.002 (.118)	-.004 (.117)
<b>Income scales (1=lowest income group; 10 highest income group)</b>	-.053** (.026)	-.054** (.026)	-.050* (.026)	-.048* (.026)	-.051* (.026)	-.051* (.027)	-.050* (.027)	-.048* (.026)	-.043* (.026)	-.047* (.026)	-.047* (.026)	-.047* (.026)
<b>Marital status (married=1)</b>	.112 (.123)	.100 (.124)	.121 (.123)	.125 (.124)	.108 (.123)	.106 (.123)	.104 (.124)	.093 (.124)	.087 (.124)	.085 (.124)	.085 (.124)	.119 (.124)
<b>Education (Tertiary education=1)</b>	-.044 (.108)	-.035 (.108)	-.028 (.108)	-.036 (.108)	-.028 (.108)	-.028 (.108)	-.034 (.109)	-.027 (.109)	-.033 (.109)	-.033 (.109)	-.033 (.109)	-.036 (.108)
<b>Employment status (base group: Retired/pensioned, Housewife, Student &amp; Others)</b>												
Full time employee	.085 (.142)	.095 (.141)	.091 (.141)	.105 (.143)	.097 (.141)	.098 (.142)	.100 (.142)	.110 (.143)	.124 (.143)	.114 (.143)	.114 (.143)	.100 (.142)
Part time employee	.376** (.173)	.391*** (.173)	.387** (.172)	.412** (.175)	.373** (.172)	.370** (.172)	.390** (.174)	.389** (.174)	.423** (.174)	.402** (.174)	.409** (.174)	.409** (.174)
Self employed	.089 (.163)	.095 (.162)	.094 (.162)	.088 (.163)	.090 (.162)	.098 (.163)	.096 (.163)	.101 (.163)	.116 (.164)	.107 (.164)	.107 (.164)	.094 (.162)
Unemployed	.129 (.182)	.157 (.182)	.152 (.181)	.153 (.182)	.122 (.183)	.116 (.183)	.106 (.183)	.120 (.184)	.138 (.184)	.123 (.184)	.123 (.184)	.156 (.182)
<b>Number of children</b>	-.032 (.025)	-.034 (.025)	-.035 (.025)	-.036 (.025)	-.031 (.025)	-.031 (.025)	-.032 (.025)	-.029 (.025)	-.033 (.025)	-.030 (.025)	-.030 (.025)	-.036 (.025)
<b>Religious person</b>	-.017 (.115)	-.014 (.115)	-.021 (.115)	-.019 (.115)	-.015 (.115)	-.001 (.116)	-.003 (.116)	.024 (.117)	.005 (.117)	.013 (.117)	.013 (.117)	-.021 (.115)
<b>Political actions</b>	.007 (.056)	.008 (.056)	.014 (.056)	.013 (.056)	.014 (.056)	.013 (.056)	.012 (.056)	.014 (.056)	.012 (.056)	.012 (.056)	.010 (.056)	.014 (.056)

<b>Free choice and control over lives (1-10 scale)</b>	.029 (.021)	.028 (.021)	.026 (.021)	.026 (.021)	.028 (.021)	.029 (.021)	.030 (.021)	.028 (.021)	.027 (.021)	.029 (.021)	.026 (.021)
<b>Believe in income equality (1-10 scale)</b>	.017 (.014)	.015 (.015)	.019 (.0149)	.017 (.014)	.018 (.015)	.018 (.014)	.016 (.015)	.017 (.014)	.016 (.015)	.015 (.015)	.018 (.015)
Constant	- .804*** (.261)	- -.786 (.264)	-.947*** (.256)	-.790*** (.254)	- .921*** (.260)	-.911*** (.254)	-.853*** (.260)	-.863*** (.254)	-.738*** (.268)	-.738*** (.268)	-.843*** (.256)
Number of observations	1,034	1,033	1,033	1,034	1,033	1,032	1,032	1,029	1,025	1,026	1,033
Wald chi2	21.18	19.50	16.13	21.95	16.26	17.10	19.19	18.32	21.32	21.12	18.99

Note: Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . "na" indicates that this question was not asked of the survey respondents in the country.

## 4.2 Sub-sample analyses

Given the fact that most revolutions began in urban areas and large cities, which is a major contributor to political change (Glaeser & Steinberg, 2017), we check if the results of the full sample analyses are driven by respondents in urban areas and large cities. Glaeser and Steinberg (2017) provide historical and empirical evidence that urbanization and large cities can have an important impact on political change processes, mainly because "cities facilitate coordinated public action and enhance the effectiveness of uprisings" (p. 58).

Tables 4 and 5 present the results for Egypt when we run separate regressions for urban areas (Panel A of Table 4), rural areas (Panel B of Table 4), large cities (Panel A of Table 5), and small cities and rural areas (Panel B of Table 5). As evident from the estimations, the association between individuals' satisfaction with amenities and environmental quality and the taste of revolt only exists for the urban areas and large cities of Egypt.

Tables 6 and 7 present the results for Iraq when we run separate regressions for urban areas (Panel A of Table 6), rural areas (Panel B of Table 6), large cities (Panel A of Table 7), and small cities and rural areas (Panel B of Table 7). Similar to the findings for Egypt, we find that the relationship between satisfaction with amenities and environmental quality indicators and the taste of revolt is statistically significant only in the large cities and urban areas of Iraq.

**Table 4. Results of Probit regressions for Egypt (Urban vs. Rural areas)**

Dependent variable: Support for revolutionary action

Panel A: Urban areas of Egypt												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The public transportation systems	<b>-0.255***</b> (.079)											
The roads and highways		<b>-0.219***</b> (.080)										
The schools			-0.088 (.079)									
The quality of air				<b>-0.187**</b> (.081)								
The quality of water					-0.088 (.069)							
The quality of health care						<b>-0.146*</b> (.079)						
The quality of housing							<b>-0.159**</b> (.081)					
Beauty construction								na				
The beauty of physical setting of city									-0.121 (.082)			
Average of amenities and environmental quality indicators										<b>-0.301***</b> (.103)		
Average of amenities											<b>0.304***</b> (.104)	
Average of environmental quality indicators												<b>-0.167**</b> (.081)
Control variables	Included	Included	Included	Included	Included	Included	Included	na	Included	Included	Included	Included
Number of observations	440	443	437	442	443	441	443	na	443	432	432	442
Wald chi2	35.06	35.80	26.63	32.11	27.53	29.37	28.36	na	27.86	34.58	34.04	30.96
Panel B: Rural areas of Egypt												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The public transportation systems	0.051 (.078)											
The roads and highways		0.004 (.078)										
The schools			-0.012 (.078)									
The quality of air				-0.048 (.074)								
The quality of water					-0.076 (.065)							
The quality of health care						-0.007 (.072)						
The quality of housing							-0.043 (.074)					
Beauty construction								na				
The beauty of physical setting of city									0.092 (.085)			
Average of amenities and environmental quality indicators										-0.010 (.097)		
Average of amenities											0.029 (.099)	
Average of environmental quality indicators												-0.077 (.075)
Control variables	Included	Included	Included	Included	Included	Included	Included	na	Included	Included	Included	Included
Number of observations	523	525	522	525	524	525	525	na	525	519	520	524
Wald chi2	69.24	69.04	69.90	69.41	68.86	69.05	69.40	na	68.23	69.44	69.57	69.16

Note: Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . “na” indicates that this question was not asked of the survey respondents in the country.

**Table 5. Results of Probit regressions for Egypt (Large cities vs. Others)**

Dependent variable: Support for revolutionary action

Panel A: Large cities												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The public transportation systems	<b>-0.249***</b> (.077)											
The roads and highways		<b>-0.230***</b> (.078)										
The schools			-0.080 (.079)									
The quality of air				<b>-0.201**</b> (.080)								
The quality of water					-0.088 (.068)							
The quality of health care						-0.121 (.077)						
The quality of housing							<b>-0.180**</b> (.080)					
Beauty construction								na				
The beauty of physical setting of city									<b>-0.157*</b> (.081)			
Average of amenities and environmental quality indicators										<b>-0.315***</b> (.102)		
Average of amenities											<b>-0.314***</b> (.103)	
Average of environmental quality indicators												<b>-0.177**</b> (.080)
Control variables	Included	Included	Included	Included	Included	Included	Included	na	Included	Included	Included	Included
Number of observations	459	462	456	461	462	460	462	na	462	451	451	461
Wald chi2	38.63	42.14	29.74	35.82	31.12	31.14	32.30	na	32.90	38.99	38.31	34.75
Panel B: Others												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The public transportation systems	.041 (.079)											
The roads and highways		.006 (.080)										
The schools			-0.024 (.078)									
The quality of air				-0.037 (.074)								
The quality of water					-0.076 (.065)							
The quality of health care						-0.029 (.072)						
The quality of housing							-0.029 (.075)					
Beauty construction								na				
The beauty of physical setting of city									.137 (.084)			
Average of amenities and environmental quality indicators										-0.006 (.096)		
Average of amenities											.032 (.099)	
Average of environmental quality indicators												-0.071 (.075)
Control variables	Included	Included	Included	Included	Included	Included	Included	na	Included	Included	Included	Included
Number of observations	504	506	503	506	505	506	506	na	506	500	501	505
Wald chi2	65.46	64.86	65.53	65.08	64.56	65.09	65.14	na	66.76	65.50	65.81	

Note: Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . “Large cities” are those with populations of more than 50,000. “Others” include cities, towns, and villages with populations of less than 50,000. “na” indicates that this question was not asked of the survey respondents in the country.

**Table 6. Results of Probit regressions for Iraq (Urban vs. Rural areas)**

Dependent variable: Support for revolutionary action

<b>Panel A: Urban areas of Iraq</b>												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The public transportation systems	na											
The roads and highways		<b>-.097*</b> (.051)										
The schools			<b>-.129**</b> (.053)									
The quality of air				-.024 (.051)								
The quality of water					<b>-.111**</b> (.056)							
The quality of health care						-.076 (.055)						
The quality of housing							-.056 (.055)					
Beauty construction								-.076 (.054)				
The beauty of physical setting of city									<b>-.121**</b> (.053)			
Average of amenities and environmental quality indicators										<b>-.162**</b> (.072)		
Average of amenities											<b>-.164**</b> (.070)	
Average of environmental quality indicators												-.079 (.060)
Control variables	na	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Number of observations		741	741	740	741	740	740	739	736	734	735	740
Wald chi2		20.60	21.49	16.01	20.02	16.84	16.54	17.14	20.23	21.11	21.30	17.89
<b>Panel B: Rural areas of Iraq</b>												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The public transportation systems	na											
The roads and highways		-.079 (.086)										
The schools			-.031 (.082)									
The quality of air				-.111 (.090)								
The quality of water					-.140 (.089)							
The quality of health care						-.004 (.094)						
The quality of housing							-.095 (.085)					
Beauty construction								-.132 (.097)				
The beauty of physical setting of city									-.043 (.097)			
Average of amenities and environmental quality indicators										-.152 (.122)		
Average of amenities											-.117 (.120)	
Average of environmental quality indicators												-.161* (.098)
Control variables	na	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Number of observations		293	292	293	293	293	292	293	293	291	293	293
Wald chi2		19.99	19.51	22.01	21.99	19.15	21.30	23.97	19.16	22.16	23.27	23.27

Note: Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . "na" indicates that this question was not asked of the survey respondents in the country.



**Table 7. Results of Probit regressions for Iraq (Large cities vs. Others)**

Dependent variable: Support for revolutionary action												
Panel A: Large cities												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The public transportation systems	na											
The roads and highways		<b>-.097*</b> (.051)										
The schools			<b>-.129*</b> (.053)									
The quality of air				-.024 (.051)								
The quality of water					<b>-.111**</b> (.056)							
The quality of health care						-.076 (.055)						
The quality of housing							-.056 (.055)					
Beauty construction								-.076 (.054)				
The beauty of physical setting of city									<b>-.121**</b> (.053)			
Average of amenities and environmental quality indicators										<b>-.162**</b> (.072)		
Average of amenities											<b>-.164**</b> (.070)	
Average of environmental quality indicators												-.079 (.060)
Control variables	na	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Number of observations	na	741	741	740	741	740	740	739	736	734	735	740
Wald chi2	na	20.60	21.49	16.01	20.02	16.84	16.54	17.14	20.23	21.11	21.30	17.89
Panel B: Others												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The public transportation systems	na											
The roads and highways		-.079 (.086)										
The schools			-.031 (.082)									
The quality of air				-.111 (.090)								
The quality of water					-.140 (.089)							
The quality of health care						-.004 (.094)						
The quality of housing							-.095 (.085)					
Beauty construction								-.132 (.097)				
The beauty of physical setting of city									-.043 (.097)			
Average of amenities and environmental quality indicators										-.152 (.122)		
Average of amenities											-.117 (.120)	
Average of environmental quality indicators												-.161* (.098)
Control variables	na	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Number of observations	na	293	292	293	293	293	292	293	293	291	291	293
Wald chi2	na	19.99	19.51	22.01	21.99	19.15	21.30	23.97	19.16	22.16	21.35	23.27

Note: Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . "Large cities" are those with populations of 50,000 and more. Others include cities, towns, and villages with populations of less than 50,000. "na" indicates that this question was not asked of the survey respondents in the country.

### ***4.3. The mediating role of life satisfaction on the link between satisfaction with amenities and environmental quality indicators and preference of revolt***

In the hypothesis development section, we argue that satisfaction with amenities and environmental quality indicators may affect support for revolution through individuals' life satisfaction. In this subsection, we examine whether individuals' life satisfaction mediates the relationship between satisfaction with amenities and environmental quality indicators and preference for revolt.

Panels A and B of Figure 1 show the mediator models for Egypt and Iraq, respectively. For both countries, there is a negative and significant relationship between the "Average of

amenities and environmental quality indicators" and "Support for revolutionary action." Additionally, the "Average of amenities and environmental quality indicators" and "Life satisfaction" are positively correlated, as expected. Finally, the coefficient of "Life satisfaction" is negative and significant when we use "Support for revolutionary action" as a dependent variable.

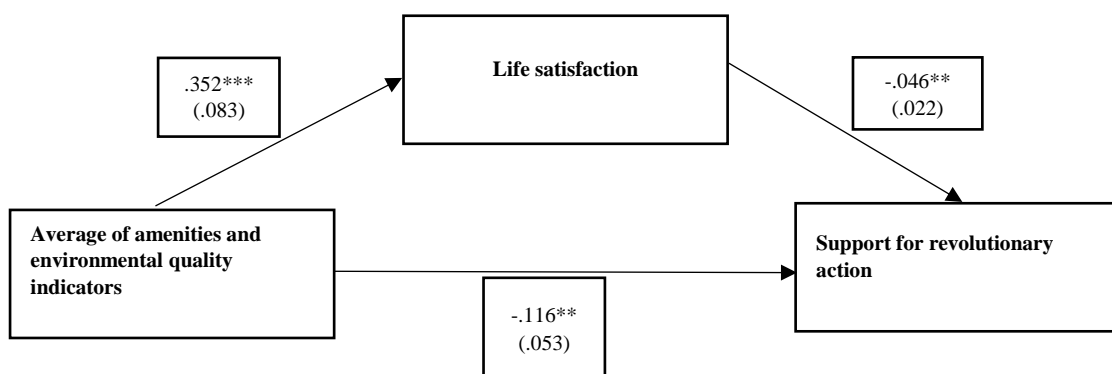
Therefore, we can conclude that there is partial mediation, meaning that the relationship between satisfaction with amenities and environmental quality indicators and support for revolutionary action is mediated by life satisfaction. In terms of the type of mediation, our results clearly show that complementary mediation occurs because the product of the direct effect and indirect effect (multiplication of three coefficients) is positive (Hair et al., 2017).

**Figure 1.** Mediation effect: Life satisfaction as a mediating variable

**A. Mediation analysis: Egypt**



**B. Mediation analysis: Iraq**



Note: Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The links between "Average of amenities and environmental quality indicators" and "Life satisfaction" is estimated by OLS with robust standard errors. The links between "Average of amenities and environmental quality indicators" and "Life satisfaction" and "Support for revolutionary action" is estimated by Probit regression with robust standard errors.

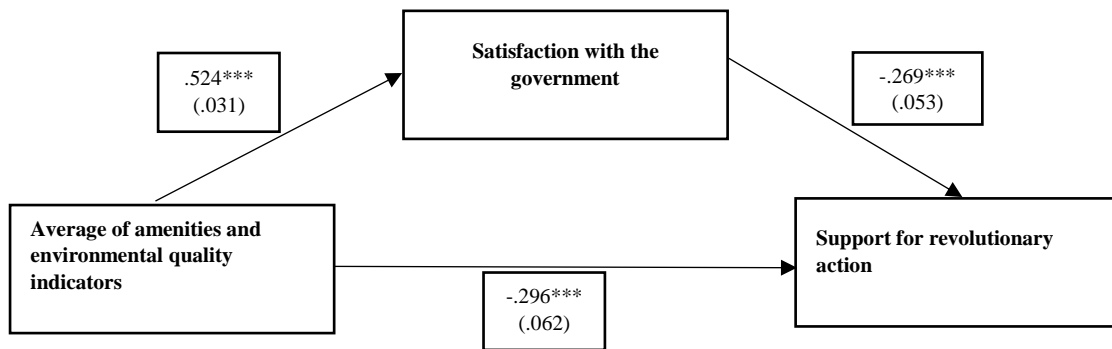
#### ***4.4. The mediating role of satisfaction with the government on the link between satisfaction with amenities and environmental quality indicators and preference for revolt***

In sub-section 4.3, we examine the mediating role of life satisfaction on the relationship between satisfaction with amenities and environmental quality indicators and support for revolution. However, it can be argued that satisfaction with amenities and environmental quality indicators first affects satisfaction with the government, which then affects preference for revolt. To test this hypothesis, we use the following question in the WVS survey: “I am going to ask a number of questions related to the current government’s performance. How would you evaluate the performance of the current government in... [The way the government performs its duties in national office]”. Respondents are asked to choose from the options of (1) Completely dissatisfied, (2) Rather dissatisfied, (3) Rather satisfied, and (4) Completely satisfied. Panels C and D of Figure 1 present the mediator models for Egypt and Iraq, respectively.

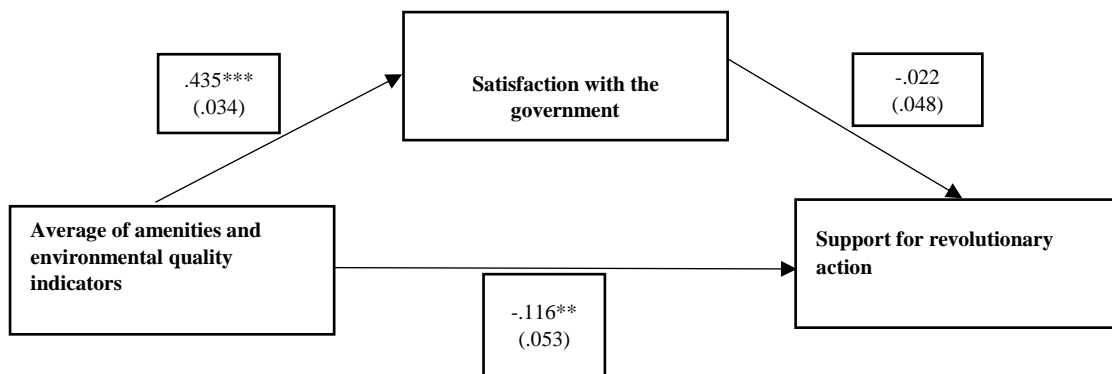
The results for Egypt show that satisfaction with amenities and environmental quality indicators affects support for revolutionary action through satisfaction with the government (see Panel C of Figure 2). Given the findings shown in Panel A of Figure 1, it can be concluded that life satisfaction and satisfaction with the government play mediating roles in Egypt’s case. However, in the case of Iraq (see Panel D of Figure 2), the analyses suggest that satisfaction with the government does not mediate the link between the “Average of amenities and environmental quality indicators” and “Support for revolutionary action”. Given the findings shown in Panel B of Figure 1, we can conclude that only life satisfaction plays a mediating role in the Iraq sample.

**Figure 2.** Mediation effect: Satisfaction with the government as a mediating variable

**C. Mediation analysis: Egypt**



**D. Mediation analysis: Iraq**



Note: Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . This link between “Average of amenities and environmental quality indicators” and “Satisfaction with government” is estimated by OLS with robust standard errors. The links between “Average of amenities and environmental quality indicators” and “Satisfaction with government” and “Support for revolutionary action” is estimated by Probit regression with robust standard errors.

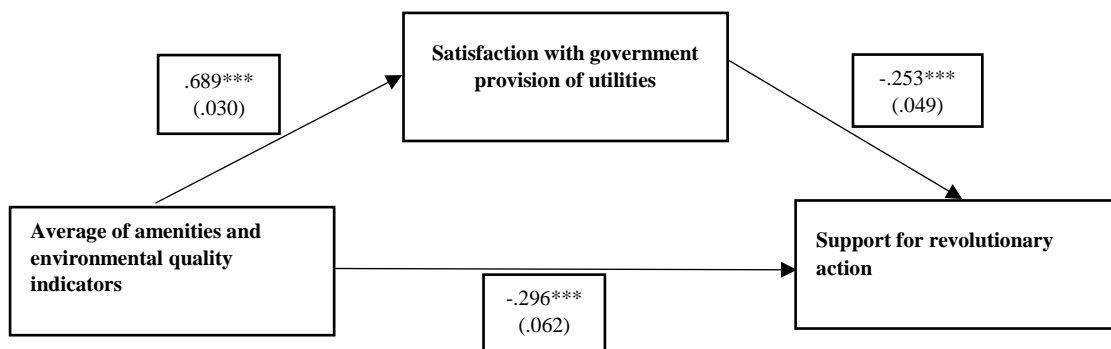
**4.5. The mediating role of satisfaction with government provision of utilities (fuel, water, electricity, gas, sanitation) on the link between satisfaction with amenities and environmental quality indicators and preference of revolt**

In addition to analyzing the mediating role of satisfaction with the government, we also test if satisfaction with government provision of utilities can explain the association between individuals' satisfaction with amenities and environmental quality and support for revolutionary action. This measure may capture the satisfaction with government performance more precisely, as far as the amenities and environmental quality are concerned. We use the following question in the WVS survey: “I am going to ask a number of questions related to the

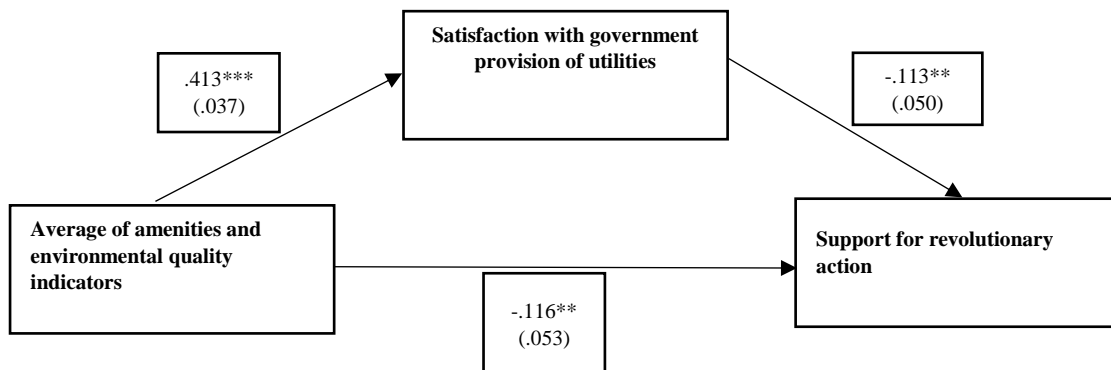
current government’s performance. How would you evaluate the performance of the current government in... [Provision of utilities (fuel, water, electricity, gas, sanitation)]”. Respondents are asked to choose from the options of (1) Completely dissatisfied, (2) Rather dissatisfied, (3) Rather satisfied, and (4) Completely satisfied. Panels E and F of Figure 3 present the mediator models for Egypt and Iraq, respectively.

**Figure 3.** Mediation effect: Satisfaction with government provision of utilities as a mediating variable

**E. Mediation analysis: Egypt**



**F. Mediation analysis: Iraq**



Note: Robust standard errors in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01. The links between “Average of amenities and environmental quality indicators” and “Satisfaction with government’s provision of utilities” is estimated by OLS with robust standard errors. The links between “Average of amenities and environmental quality indicators” and “Satisfaction with government’s provision of utilities” and “Support for revolutionary action” is estimated by Probit regression with robust standard errors.

## **5. Conclusion**

Several studies have investigated the macro-level factors (e.g., GDP per capita, income inequality) and individual socio-economic determinants (e.g., age, gender, income) that influence individuals' preferences for radical societal change. We contribute to this literature by demonstrating the association between individuals' dissatisfaction with amenities and environmental quality indicators and their support for revolutionary action in Egypt and Iraq, both of which have experienced multiple uprisings over the past 50 years.

Using recent WVS7 data and Probit regressions, we find that individuals who are more dissatisfied with amenities and environmental quality tend to have a stronger inclination toward revolution in both countries. This result is particularly evident in urban areas, especially in large cities, compared to rural areas and small cities in both countries. In Egypt, dissatisfaction with public transportation systems, roads and highways, air quality, and housing quality are positively and significantly associated with individuals' preference for revolution. In Iraq, individuals dissatisfied with roads and highways, water quality, school quality, and the physical setting of cities tend to prefer revolutionary actions.

Our findings can inform policymakers in Egypt and Iraq on how to reduce the likelihood of revolutionary actions by their citizens. For example, traffic congestion is a significant problem in the Greater Cairo Metropolitan Area (GCMA), which is home to over 20 million people (approximately 1/5 of Egypt's population). According to the World Bank (2014), traffic congestion has a considerable and negative impact on the economy and citizens' quality of life by decreasing labor productivity, increasing fuel consumption and wear and tear on vehicles, emitting harmful pollutants, decreasing air quality, raising transportation costs for businesses, and making the GCMA an unappealing location for businesses and industry. The World Bank (2014) suggests that the government can overcome traffic challenges by implementing corridor management schemes, strengthening the GCMA regulatory authority's capacity and authority, introducing traffic-related charges (to rationalize traveling behavior), and investing more to expand the transit network.

Water scarcity and water quality degradation have been significant challenges for Iraqi citizens for the past two decades, which is a primary reason for Iraqi dissatisfaction with water quality in the country. Therefore, we recommend that Iraqi policymakers allocate more public funding to the development of water infrastructure projects and programs that provide clean and reliable drinking water to people. The Iraqi government can also encourage international water

treatment and wastewater management companies to participate in water infrastructure projects by offering tax incentives and reducing excessive bureaucracy and bribery.

One limitation of our research is that we cannot claim a causal relationship between satisfaction with amenities and environmental quality indicators and preference for revolution due to the cross-sectional nature of our data. In other words, since the WVS does not follow the same respondents over time, we cannot observe the effect of changes in an individual's satisfaction on their support for revolutionary action. Future research may utilize longitudinal data to test our model and demonstrate a more robust relationship between these variables of interest.

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