



Explaining the Intensity of the Arab Spring

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Abstract

Politicians and pundits are quick to say that the Arab Spring has been caused by everything from an ominous “youth bulge” in the region’s population to the spread of social media like Facebook and Twitter. Other observers blame the recent unrest on high levels of unemployment or on the government corruption endemic to the region. While there is a certain logic or intuitive sense to any or all these explanations, they have yet to be rigorously tested. Moreover, we do not know if these same factors explain intraregional variation in levels of unrest, or if, instead, factors specific to each particular country have caused some regimes to succumb to the violence while others have emerged unscathed. This article tests the conventional wisdom of the Arab Spring. We find some support for the notion that perceptions of government corruption and sudden price increases correlate with higher levels of unrest, although our confidence in these findings is limited by the small number of countries in our sample. Meanwhile, we find almost no evidence that population pressure or other forms of economic hardship are significant causes of intraregional variation in the intensity of unrest. Most strikingly, despite being touted as the “Twitter Revolution,” we find no evidence that unrest correlates with Internet access, cell phone use, or the use of social media such as Facebook and Twitter. These findings, such as they are, invite political observers and social scientists to search for other, case-specific causes of civil unrest and regime instability.

Introduction

The Arab Spring began in December 2010, with the death of a Tunisian man protesting his treatment by government authorities. Antigovernment unrest soon spread to Egypt and around the Middle East. In the months that followed, the region was much transformed and change is still underway. Long-standing dictatorships in Tunisia, Egypt, Libya, and Yemen were all overthrown, leaving those countries with more uncertainty than democracy; and the leadership’s hold on power in Syria remains precarious to this day, even as violence from that country has spilled across borders and threatened whatever stability might have been left in the wake of



the storm. Today, as optimism about wider and lasting democratic transformation has dwindled, this “Spring” has come to look more like 1848 than 1989.

Although it has given little consolation to the people of the region, the Arab Spring provided fertile ground for pundits and armchair theorists wishing to make grand pronouncements as to its causes. For the social scientist, however, variation in the level of unrest from one country to another makes the region an ideal laboratory for a natural experiment on the causes of political and social upheaval. In places like Morocco, Kuwait, Algeria, and Jordan, for example, massive demonstrations reached into the thousands and, in some cases, prompted governments to implement reforms (however, incremental) in response to protestor demands. But while unrest in these countries was indeed chronic and widespread, it never seemed to threaten the very existence of their ruling regimes, as it did in Syria or Bahrain. Meanwhile, in the oil-rich monarchies of Saudi Arabia and Oman (and also in Mauritania), sporadic demonstrations reached into the hundreds (not thousands). For the most part, they were relatively contained, relatively inconsequential, and warranted little more than passing remark in the world media (at least for now).

What accounts for this variation in the intensity of the Arab Spring uprising across the countries of the Middle East? Why did some regimes experience massive and destabilizing unrest, while others experienced only demonstrations and sporadic protests? Unsurprisingly, politicians and pundits have offered an array of answers to these fascinating questions. Unfortunately, few are supported by rigorous demographic data and none by the systematic standards of social scientific inquiry. Without this, explanations for variation in the intensity of the Arab Spring — as well as explanations for the general uprising itself — remain mere conjecture. As theorists, as policymakers, and as citizens, we must hold our scholarship, action, and our rhetoric to a higher standard.

For the purposes of this investigation, we have compiled data on a number of “likely suspects” for the upheaval in the Middle East. These include data pertaining to levels of economic hardship, government corruption, population pressure, and the relative ubiquity of social media. Having developed indicators for the magnitude of these factors, we run a number of statistical tests (ordered logistic regressions) to determine if any of these variables reliably predict the emergence of destabilizing unrest in the various countries of the region. We also include a section that explains the logic of logistic regression, so as to make our findings accessible to a wider audience of policy analysts and interested observers. As such, we believe our conclusions will be of interest both to academic social scientists as well as to those with an interest in the Middle East or in the nature of social and political unrest more generally.

While investigations of this sort will, by their very nature, be subject to competing interpretations of just what constitutes different levels of unrest, and while social scientists can do little to increase the number of observations in their studies, our preliminary investigation of the relative intensity of the Arab Spring has produced some limited results.¹ We find, for example, that perceptions of government corruption



and rising prices did indeed increase the likelihood that a country would experience higher levels of destabilizing unrest. Conversely, we find little evidence that unrest correlated with population pressure, poverty, unemployment, or even ethnoreligious heterogeneity. In the realm of electronic media, our results are equally inconclusive: We found no evidence whatsoever that levels of unrest correlated with social media use, Internet access, cell phone penetration or even adult literacy. In this “Twitter Revolution,” traditional grievances like government corruption and inflation appear to have mattered more than access to social media.

This apparent absence of correlation reveals something about the nature of the Arab Spring. Though they are fascinating new tools for the coordination of national resistance, social media and the Internet do not reliably explain levels of instability in any given country. Rather, the causes of destabilizing unrest seem to be more ordinary factors like perceptions of regime corruption and, perhaps, some forms of economic hardship. Indeed, even measures of economic hardship (like unemployment and poverty) do not explain the intensity of unrest as well as political deprivation.² The factors that seem to matter most are those that relate to perceived unfairness and, perhaps, a loss of hope that things will eventually improve.

Most importantly, the weakness of our findings — even as they relate to corruption and inflation — suggest that all commentary that claims to know the causes of the Arab Spring should be met with appropriate skepticism. Our findings are tentative and suggestive; but in a statistical sense, they are far from conclusive. Despite our reliance on the comparative method and statistical analysis in this study, our conclusion is also an appeal for qualitative, case-specific research into the causes of civil strife, regime instability, and political violence.

What Others Have Said

The wave of unrest that we now call the Arab Spring was quickly followed by a flurry of armchair theories as to what caused the conflagration to occur. Even before the ouster of Tunisian President Zine Ben-Ali (the first government-level casualty of the revolution), noted *Foreign Policy* commentator Marc Lynch suggested on his blog that a “combination of economic desperation, fury over perceived corruption, and a blocked political order” had exacerbated rising food prices to cause the flurry of disturbances.³ Politicians, pundits, and even scholars quickly followed suit, attributing the unrest to everything from rising literacy to a falling birth rate, from the advance of Western secularism to a resurgence of pan-Arab nationalism, and from a widening income gap to an ominous “youth bulge” in the region’s population pyramid. (Ahmed, 2012, p. 1; DeLong-Bas, 2012, pp. 1–2; Goldstone, 2011, pp. 1–3; Rogan, 2013, p. 331; Salih, 2013, pp. 186–189; Todd, 2011, pp. 1–2) Even the terminology for the uprising — the “Twitter Revolution” or the “Arab Awakening” — suggests that a long-repressed populist yearning for democracy and self-determination had been suddenly unleashed (see especially Ajami, 2012, pp. 56–57), fueled by rage on the Arab Street and enabled by new social media like Facebook



and Twitter. (see especially Akin, Encina, Restivo, Schwartz, & Tyagi, 2012, p. 1; Gvosdev, 2011, pp. 1–3; Howard & Hussain, 2013, *passim*; Huang, 2011, p. 1; Hussain & Howard, 2013, pp. 50–51). A recent report on *60 Minutes* even called *Al Jazeera* “the engine of the Arab Spring” (Qatar, 2012). And Blake Hounshell, managing editor of *Foreign Policy* magazine, recently wrote that it sometimes seemed as if the Arab Spring had been “masterminded . . . from Doha,” the Qatari capital where the independent television network is based.⁴

With explanations for the Arab Spring emerging as relentlessly as the protests themselves, several possible factors seem to have achieved particular prominence in the scholarly and not-so-scholarly literature. First, economic hardship and inequality are likely culprits in any outburst of civil strife, particularly in the context of rising food prices and a global economic crisis. It would not be surprising if countries with higher rates of unemployment, dramatic price spikes, or a wider divide between rich and poor also displayed higher levels of social unrest. Second, the engine of economic distress and alienation is itself fueled by intense population pressure throughout the region. The population of the Middle East is increasingly young, and the average median age among the countries of the Arab World is well under 25 (In the United States, it is almost 37). Swelling ranks of unemployed, disaffected youth cannot bode well for the already-precarious regimes of the region. Third, the precariousness of these regimes can only be exacerbated when the huddled masses they oppress perceive their leaders to be inept and corrupt. It would, therefore, stand to reason that countries that are perceived to be more corrupt by their populations would face more intense and more persistent unrest.⁵ Finally, social media such as Facebook and Twitter have been widely celebrated as tools, if not also as triggers, of the regional maelstrom.⁶ In either capacity, a hypothesis test of the effects of social media on civil unrest would predict higher levels of unrest in countries with higher Twitter and Facebook penetration rates and higher levels of Internet connectivity.

The problem with these explanations is not that they are implausible. Indeed, their plausibility is precisely what keeps them in the public discussion. The problem is that they are largely untested — and to a certain extent, untestable.⁷ Despite the intuitive nature of these factors as potential causes for unrest, it remains the case that things like unemployment, population pressure, and bad governance are chronic conditions of the region as a whole — and therefore, might not be sufficient explanations for intraregional variation in the level of unrest. Moreover, despite how exciting they are for users and for social theorists alike, social media are toys, not tools, in the absence of a population willing to use them for the purposes of social and political mobilization. Indeed, the “critical issue,” argues Lisa Anderson in “Demystifying the Arab Spring,” is not “how activists used technology to share ideas and tactics [but] how and why these . . . techniques resonated in their various local contexts” (Anderson, 2011, pp. 2–3). Insofar as things like unemployment, corruption, and social media are common to the countries of the region, we cannot use them to explain differences in the level of unrest among them.⁸ We cannot, in other



words, test these factors in a methodologically rigorous way if we do not find sufficient variation on the independent variable.

That said, if these likely suspects are indeed the causes of unrest in the region as a whole, it would stand to reason that levels of unrest would be greater in those particular countries where these factors are more widespread. If the use of social media was really an important cause of the uprising, than countries with higher levels of Internet connectivity or with deeper Twitter penetration would be the very countries that experienced the most unrest. If the Arab Spring was really caused by rising unemployment among the swelling ranks of the younger generation, then those regimes that lorded over the largest armies of disaffected youth should have been on the front lines of the battle to stay in power. And if the Arab Awakening is really the result of a modern and Internet savvy generation waking up and coming to realize that their sultans wear no clothes, then those regimes that are most corrupt should have been the prime targets of their fury. In other words, if the Arab Spring was really the result of the factors we have identified — indeed, even if these were important but not necessarily exhaustive causes of the unrest — then we should observe at least a partial correlation between significant, antiregime agitation, on the one hand, and economic hardship, corruption, youth, and social media, on the other. Conversely, those regimes that seem to have survived the storm unscathed should have been those where would-be agitators were few in number or otherwise employed, where they did not have access to the powerful electronic tools of the new revolutionary toolkit, or where government was good enough that the desire to take to the streets in the first place was muted or nonexistent.

Our research shows that, for the most part, this conjectural correlation does not, in fact, exist. Countries where leaders have been overthrown — or where regimes desperately cling to precarious power — are no more likely than any other countries in the region to display high levels of unemployment. Their population pyramids are bottom-heavy, but not particularly so. And their citizens are not significantly more likely to have access to the Internet or to own a mobile phone. Conversely, there does seem to be some basis for the suspicion that perceptions of government corruption, and, to a lesser extent, rising prices do correlate with higher levels of unrest. Technically, our conclusions in this regard are statistically significant; however, the sample size is small enough that we are hesitant to draw any but tentative conclusions. The small sample size means that the reliability of our findings is weak. And our findings, such as they are, suggest that there is only a weak correlation, if any, between most of the likely suspect variables and observed levels of unrest. We discuss our confidence in these findings (or lack thereof) in greater detail below.

Given the admittedly limited nature of our conclusion, we hope this investigation will contribute to political discourse in two important ways. First, the correlation we do observe between political unrest, on the one hand, and corruption and economic hardship, on the other, may serve to focus further research on the Arab Spring, if not also on democratization and social movements more generally. In-depth case



studies and surveys may be fruitful avenues for further research on these issues, and future researchers may do well to focus particular attention on these factors as likely suspects with particular promise. In interrogating the central role of these likely culprits, our aim is not to dismiss the possibility of a science of social revolutions. Rather, it is to expand the discussion to include approaches that are more methodologically appropriate and more nuanced to the particularities of each case.

In a deeper and more general sense, however, we hope that our conclusions will also serve as a warning about assuming we know too much. Our statistical tests do not tell us a great deal about the causes of the Arab Spring; rather, they tell us that the knowledge we think we have of the event is more limited than ordinarily supposed. Politicians, pundits, journalists, and even academics are not so much wrong about the causes of the Arab Spring, as they are in the confidence they seem to display when discussing them. In applying our quantitatively rigorous techniques to the puzzle of Middle East unrest, our negative results serve as a warning against the hubris so common in the reflective discourse of social phenomena.⁹

The Dependent Variable: Levels of Unrest

Though every country in the Middle East, not to mention around the globe, has been influenced by the turmoil of the Arab Spring, the Arab countries of the region have experienced the widest range of outcomes. Although the degree of unrest is fundamentally a continuous (and imprecise) property, it is possible to place the diverse experiences of each of these countries into one of four distinct, ordinal categories. These categories are represented in Table 1.

Table 1: Level of Unrest by Country

Country	Outcome	
Egypt	Regime overthrown.	"Regime threatened or removed"
Libya	Regime overthrown.	
Tunisia	Regime overthrown.	
Yemen	Regime overthrown.	
Bahrain	Militarized, civil insurrection.	
Syria	Militarized, civil insurrection.	
Algeria	Major demonstrations.	
Iraq	Major demonstrations.	
Jordan	Major demonstrations.	
Kuwait	Major demonstrations.	
Lebanon	Major demonstrations.	
Morocco	Major demonstrations.	
Mauritania	Minor, isolated protests, if any.	
Oman	Minor, isolated protests, if any.	
Qatar	Minor, isolated protests, if any.	
Saudi Arabia	Minor, isolated protests, if any.	
UAE	Minor, isolated protests, if any.	



In Tunisia, Egypt, Libya, and Yemen, the ruling regimes were overthrown, and their leaders arrested, killed, or forced to leave the country. These outcomes were, thus, qualitatively different from the situation in Bahrain or Syria, where militarized insurgencies threatened — or still threaten — the very existence of the regime. In Algeria, Iraq, Jordan, Kuwait, Lebanon, and Morocco, major demonstrations — numbering in the thousands or tens of thousands — rocked the countries in question, forcing heads of government (but not heads of state) to resign their positions and forcing state responses that ranged from brutal crackdowns or promises of significant constitutional reform. Finally, in Mauritania, Saudi Arabia, and the remaining Gulf States of Oman, Qatar, and UAE, protests were minor, isolated, and short-lived. They typically numbered in the hundreds, not in the thousands, and have not had significant lasting influence on the countries in question. These distinctions are, admittedly, open to interpretation. But they do make intuitive sense and are consistent with most reports on the region's unrest.

While there is a clear, observable, and often-dramatic difference between the countries in the top two tiers of our table, we have decided to collapse these outcomes into a single, more-inclusive value: "Regime threatened or removed." We have done so because we want to make sure that ours is a measure of the intensity of unrest, not of a regime's capacity to survive. While in the world of political consequences, there is indeed an important difference between al-Assad's ongoing last stand and Gaddafi's dramatic demise, the fact remains that, but for Western intervention, Gaddafi might still be clinging to precarious power. Conversely, Syria's al-Assad is really just an international intervention away from becoming the Arab Spring's next fatality. Indeed, even Bahrain's battered regime might have fallen long ago were it not for Saudi intervention to back it up. In other words, we see little relevant difference in the degree of unrest between those countries where major, civil disturbances threaten the existence of the ruling regime and those countries where similar disturbances have already made good on that threat. In political and historical terms, of course, the difference is crucial. But as our intention is to measure variation in the ground-up pressure for change, we must be careful not to measure equal and opposite forces that seek to resist it.

For various methodological reasons, we have excluded a number of Middle Eastern countries from our study. For example, even though events in Iran and Turkey are often discussed in the context of wider regional developments,¹⁰ we have excluded these powerful and dynamic countries from our analysis because they are not predominantly Arab. We have excluded Israel for the same reason, even though its population is 20% Arab, and even though Arabic is one of its official languages. Despite their membership in the Arab League, the Comoros, Djibouti, and Somalia have also been excluded from this study because these are countries where the majority of citizens do not speak Arabic and do not identify as "Arab."¹¹ Conceptually, it would be appropriate to include the Palestinian Authority in this study — either as a single observation or as two — the West Bank and the Gaza Strip, because each



of these regions is under the control of a distinct political entity. Unfortunately, because reliable data from the Palestinian territories are so difficult to find, we have had to exclude these cases from our study as well.

The Likely Suspects: Possible Causes of Arab Unrest

Our study tests the hypothesis that factors such as population pressure, economic hardship, government corruption, and electronic media correlate with higher levels of unrest among countries affected by the Arab Spring. In addition to these likely suspects, we also test the influence of a number of other potential factors — factors that may not receive the same attention in the global media but that might, in any case, be causes of regional unrest. To conduct these tests, we have constructed a series of bivariate, ordered logistic regression models, where we determine the degree to which each of these factors — taken individually — is responsible for increasing the likelihood of unrest in any given country.

We specify our causal variables as follows:

Corruption is a country's score on Transparency International's "Corruption Perception Index 2010." Scores range from 1 to 10, with scores of "10" representing countries that are regarded as "least corrupt" (i.e., "most transparent"). Because higher scores represent countries that are less corrupt, we hypothesize an inverse relationship, where lower scores on the corruption index correlate with a higher likelihood of unrest.

Ethnoreligious Heterogeneity. Although ethnoreligious heterogeneity was not often discussed as an important cause of unrest, the fact remains that some of the most fractious conflicts in the region have an ethnic component. In some places with the highest levels of unrest (including Yemen, Bahrain, and Syria), the uprisings associated with the Arab Spring reopened old wounds and exacerbated tensions between regimes and their citizens, especially when members of each predominantly belonged to distinct ethnoreligious communities. Indeed, even where the direct cause of unrest is not ethnic tension *per se*, ethnic divisions have a tendency to map on to existing political and economic fissures.¹² To measure ethnoreligious heterogeneity, we have adopted and adapted an index developed by Markku Laakso and Rein Taagepera and more commonly used by political scientists to study political party systems, whereby N , the effective number of ethnoreligious groups in a society, is defined by the equation:

$$N = \frac{1}{\sum s_i^2}$$

In this equation, s_i is the share of the population constituted by the i -th ethnoreligious group. This equation has the advantage of accounting for differences in the relative sizes of ethnoreligious groups by considering the impact of large (and



politically relevant) ethnic minorities and “ignoring” the effect of tiny, inconsequential ones.¹³ We expect higher levels of unrest to correlate with higher effective ethno-religious fractionalization.¹⁴

Population Pressure is measured in a variety of ways. We consider the median age of a country’s population (“Median Age”); the portion of a country’s population that is under the age of 25 (“Percent under 25”); and the portion of a country’s population that is between the ages of 15 and 29 (“Percent 15–29”). We predict that unrest is more likely in countries with younger populations (i.e., with lower scores on “Median Age” and higher scores on “Percent under 25” and “Percent 15–29”).¹⁵

Unemployment is one measure of economic hardship. In most cases, we have used the unemployment rate listed in the CIA *World Factbook* for 2011. As higher unemployment rates indicate greater economic hardship, we expect a direct relationship between unemployment rates and levels of unrest.¹⁶

Poverty is another measure of general economic hardship. Our Gross Domestic Product (GDP) per capita data comes from a 2010 International Monetary Fund report. Because we hypothesize that poorer countries will be more likely to face destabilizing unrest, we expect a negative relationship between GDP per capita and the level of unrest in any given country.

Inflation in the price of food and other commodities is also an indicator of economic hardship. Our scores for this variable indicate the percentage change in a country’s Consumer Price Index (CPI) from 2009 to 2010, as reported in the 2012 IMF World Economic Outlook Database. We anticipate more dramatic increases in CPI to correlate with higher levels of unrest.

Income inequality is another factor that potentially affects the level of unrest. However, there is uncertainty as to whether the relationship would be linear or parabolic (i.e., \cap -shaped). One hypothesis holds that as economic inequality increases, so too does the motivation for the “have-nots” to rise against the status quo. If this is the case, we would expect increases in inequality to have a linear and positive effect on the level of unrest. (See Figure 1.) To capture this relationship, we identify economic inequality with the variable “Gini,” which represents a country’s score on the Gini Index.¹⁷ As higher scores indicate higher levels of inequality, we hypothesize Gini scores and levels of unrest to be positively correlated.

There is some reason to speculate, however, that inequality would have a \cap -shaped influence on the level of unrest. When inequality is slight, the have-nots (such as they are) have less motivation to rise up against their regimes; they also have more to lose from political instability. But when inequality is particularly high, disaffected classes lose the capacity to achieve their ends through political agitation; the chasm between rich and poor is so wide that elite tools to suppress unrest overpower the wherewithal of the poor to resist them. As such, we would expect the highest likelihood of unrest to correlate with moderate levels of inequality, where would-be agitators have both the capacity and the motivation to rise up against an oppressive status quo.¹⁸ (See Figure 2.) “Gini-Squared” estimates the effect of

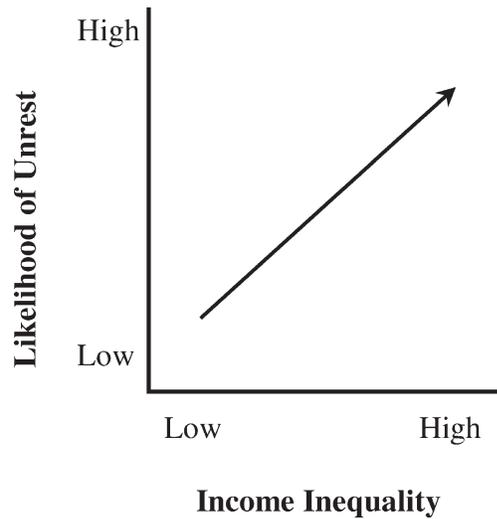


Figure 1: Effect of income inequality on likelihood of unrest if relationship is *positive and linear*.

income inequality on the level of unrest as an inverse, parabolic relationship, where a negative value indicates that unrest is most likely when Gini scores are moderate.

Internet, cell phone, and social media access are probably the most discussed likely suspects of the Arab Spring. We measure this potential factor in a number of ways: Internet connectivity measures the percentage of a country's population that has access to the Internet. Mobile-cellular penetration is the percentage that has a mobile-cellular subscription.¹⁹ Twitter and Facebook penetration measure the

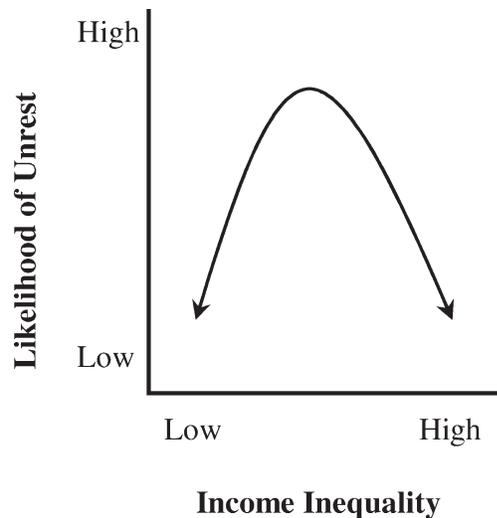


Figure 2: Effect of income inequality on likelihood of unrest if relationship is *negative and parabolic*.



percentage of people in a country who are active Twitter or Facebook users.²⁰ Al Jazeera penetration is also hypothesized to have an effect on unrest in the region.²¹ Finally, we include Adult Literacy rates as a general measure of education levels and the potential for technological sophistication.²² We would expect higher values on each of these variables to increase the likelihood of unrest in a given country.

This list of potential causal variables is by no means exhaustive. However, these variables do represent the most widely discussed (and in some sense, the most intuitive) potential causes of unrest in the region. Our findings — discussed in detail in the next section — suggest that a limited number of these factors (namely, corruption and perhaps inflation) may indeed be correlated with the emergence and intensity of social and political unrest. However, our primary purpose is not to establish which, if any, of these factors is a definitive cause the uprising. Rather, we intend to demonstrate: First, that despite their status as exciting new tools of political mobilization (and exciting new subjects of behavioral research), social media and Internet connectivity are probably not important causes of the Arab Spring; second, while we cannot conclusively and definitively establish the relevance of any of these factors, traditional causes of social discontent such as corruption and inflation at least show the most promise as hypotheses in future research; and finally, we hope to highlight the limits of quantitative social analysis of events as vast and complex as regional revolution. In other words, we have used these sophisticated quantitative techniques, at least in part, so as to demonstrate their limitations. This epistemological humility — equally rare in politics and the popular press as it is in social scientific inquiry — will at least lead our scholarship to consider cultural and historical factors of social unrest — factors that, despite being qualitative and harder to define with rigorous precision, might actually be causes of significant world events.

The Logic of Logistic Regression

Our study uses a series of ordered, bivariate logistic regression models to determine the level of correlation (if any) between our likely suspects and the emergence of unrest in the countries of the Middle East. This section explains the logic of logistic regression and how it applies to our assessment of the causes of the Arab Spring.

In its most basic (bivariate) application, logistic regression helps us determine the likelihood that a specified event will occur or not occur, based on a single causal factor. The notion is that if a certain factor really is a contributing cause of an event, then the presence of that factor would increase the likelihood that such an event will occur in any given case. As a result, we would expect to observe a correlation between the presence of the causal factor and the occurrence of the specified event. In looking at a group of cases, we would expect those cases where the event occurs to also be the cases where that causal factor is present and strongest. By contrast, we would expect to see the event not take place in most cases where the causal factor is weak or nonexistent.



To illustrate this notion, consider the effect that something like hours of study may have on the occurrence of a specified event, say, a student passing an exam. In this example, the student's performance on the exam is conceptualized as a dichotomous, dependent variable — the student will either pass the exam or he would not — and the likelihood that he passes is hypothesized to be a function of a single, causal variable — in this case, the number of hours he studies for the exam. We hypothesize that the more hours a student studies for the exam, the more likely it is that he will pass. And in the class as a whole, we would expect to see a correlation between studying and passing, on the one hand, and between not studying and not passing, on the other.

Of course, in the world of logistic regression, there are no guarantees. Because study is only one factor in a student's performance on the exam, and because there is random variation in any given sample of students, there may be some students who study for many hours and still do not pass and others who pass even though they hardly studied at all. Still, on the whole and in the aggregate, we would expect to see longer hours of study correlate with a higher likelihood of passing.

Logistic regression applies quantitative rigor to this prediction. By comparing hours of study with test results for a group of students in a class, logistic regression helps us determine the degree to which each additional hour of study really affects a student's likelihood of passing the exam. Assuming absolute values between 0 and 1, a regression coefficient (symbolized by " β ") indicates the magnitude of the effect, with higher values indicating a relatively strong relationship between the cause and the effect (Studying really does increase the likelihood that a student will pass.) and lower values indicating a weak relationship. Where the strength of a relationship is weak, we may want to direct our attention to other potential causes of student success (natural intelligence, homework performance, hours of sleep the night before, etc.).

It is important to note that, for some causal variables, the relationship will be inverse (and the coefficient will take on a negative value, between 0 and -1). This indicates a situation where higher values on the causal factor lead to a lower likelihood that the student will pass. The number of classroom absences or the number of hours spent partying on the night before the exam may both be assumed to have a negative effect on the likelihood of passing.

Ordered logistic regression, such as that used in our study, follows the same logic but expands on it by allowing us to conceptualize the predicted event as a series of events, whereby a given input increases the likelihood of "progressing" to the next of several levels in an ordinal series of outcomes. We could, for example, measure the effect of study on a student's chances, not simply of passing the exam, but of getting a C, a B, or an A. It should be remembered that, as is usually the case with statistical analyses, this is not so much a prediction as to what would happen with any given student, but about an aggregate tendency we would expect to observe among a group of individuals in a sample.



Taking what we learn in the classroom to an analysis of real-world events, our ordered logistic regression provides us with a way to measure the relative impact of various causal factors on the level of unrest in any given country of the Middle East. Our regression coefficients ($\beta_{\text{corruption}}$, $\beta_{\text{unemployment}}$, β_{gini} , β_{Twitter} , etc.) tell us the degree to which corruption, unemployment, income inequality, or Twitter penetration (respectively) bear responsibility for a country's "progression" from minor to major disturbances, or from major disturbances to sustained civil war. Systematic comparison of the countries in the Arab Middle East will allow us to determine which, if any, of these "likely suspects" correlate with higher levels of unrest. The results of our logistic regression are themselves explanations for the intensity of the Arab Spring.

What We Found

Our findings serve as a challenge to conventional wisdom and as a guide for future research. We find some indication that corruption, and perhaps even inflation, correlate with higher levels of unrest. This makes intuitive sense and matches our predictions, although it does not necessarily match the relative lack of passion with which these "plain old" factors are discussed in the popular press. Conversely, we find no evidence whatsoever that such ballyhooed factors as mobile-cellular connectivity or Facebook and Twitter penetration correlate with higher levels of unrest; the results for population pressure — that other "most likely of suspects" — are equally lackluster. It is interesting that our other measures of economic hardship (unemployment and income inequality) almost never seem to correlate with higher levels of unrest. Finally, it should be noted that, technically speaking, a number of other factors (GDP per capita; Al Jazeera penetration; maybe even Internet access) demonstrate (or might appear to demonstrate) a statistically significant relationship with levels of unrest. However, in these cases, the strength of the relationship is so weak that we hesitate to list them as important causal factors.

In Table 2, we list our most promising conclusions. In fact, we tested a wide variety of potential causal factors, both in isolation and in combination with one another. For example, we also tested Internet access using an indicator developed by the Economist Intelligence Unit. In tests using these other models and variables, the results were almost never statistically significant, and never consistently so.

Of all the variables we tested, only corruption correlates with levels of unrest to a degree that is both significant and statistically significant. In other words, at $\beta_{\text{corruption}} = -.6890$, the relationship between corruption and unrest is both negative and robust; and at $p < .048$ (for a two-tailed test), we can say with relative confidence that a relationship of this strength is not likely the result of random chance. It should be remembered that the Transparency International Index is actually a measure of transparency, not corruption. Thus, on its 1–10 scale, lower values indicate



Table 2: Regression Results

Variable	Coefficient (Standard Error) p-value
Corruption	-0.6890 (0.3481)
Ethno-religious Heterogeneity	0.048 0.1556 (0.7387)
Population Pressure (Median Age)	0.833 -0.0538 (0.1165)
Population Pressure (%<25)	0.644 0.0571 (0.0516)
Population Pressure (% between 15-29)	0.268 -0.3977 (0.3371)
Unemployment	0.238 0.0883 (0.0598)
GDP per capita	-0.0001 (0.0000) [<i>sic</i>]
Inflation	0.081 0.3000 (0.1756)
Income Inequality: Linear (Gini)	0.088 0.0428 (0.1005)
Income Inequality: \cap -shaped (Gini Squared)	0.670 0.0005 (0.0013)
Internet Access	0.729 -0.0278 (0.0287)
Mobile-Cellular Penetration	0.332 -0.0147 (0.0114)
Twitter	0.199 -0.1390 (0.1945)
Facebook	0.475 -0.0397 (0.0355)
Al-Jazeera Penetration (excluding Mauritania)	0.263 -0.0877 (0.0390)
Adult Literacy	0.025 -0.0204 (0.0357)
	0.568

Reported p values are based on a 2-tailed test of significance.



countries where the population perceives its government to be corrupt; higher values indicate countries with governments that are perceived to be transparent or fair. As a result, the negative value of the corruption coefficient is consistent with our hypothesis that more transparent countries are less likely to experience destabilizing unrest, and more corrupt countries (i.e., less transparent ones) are more likely to face destabilizing unrest.²³

As for economic factors, neither unemployment nor income inequality seem to bear any significant influence on the likelihood of unrest. Indeed, the only other variable that approaches corruption's level of significance is inflation, another factor that is both intuitively sensible as a cause of unrest and conspicuously absent from so many discussions of it. Interestingly, at $p < .081$, the level of statistical significance for GDP per capita does indeed suggest that there is a real relationship between poverty and unrest. Furthermore, the negative value of the coefficient suggests that lower levels of GDP per capita correlate with higher levels of unrest — also consistent with our hypothesis. However, in this case, the magnitude of the coefficient is so tiny ($\beta_{\text{GDP/cap}} = -.0001$) that we must conclude that, even if poverty has a real impact on the level of unrest, that impact is weak and virtually imperceptible. Of the economic hardship variables, only inflation strikes us as having both a real and significant influence on levels of destabilizing unrest across the region.

Despite our hope of finding strong conclusions (one way or another) regarding the much-touted effects of electronic and social media, the results are largely inconclusive.²⁴ Certainly, we do not find any evidence that access to electronic media contributed to the likelihood of unrest. Neither Internet access, nor cell phone penetration, nor Twitter or Facebook use correlated in any significant way with higher levels of unrest. Like GDP per capita, Al Jazeera penetration might appear to have a significant impact on levels of unrest ($p < .025$); however, with the absolute magnitude of the coefficient so small, our view is that statistical significance, in this case, should not be taken to imply that this factor was a significant cause of variation in the level of unrest across the region.²⁵ In short, test results for our social media variables are neither robust nor consistent enough to give us much confidence that these are significant causes of social upheaval in the Arab world.

Surprisingly, while very few of our likely suspects explain levels of unrest consistently or significantly, the few that show any promise whatsoever are not necessarily the ones that receive the most attention. The fact that corruption or inflation might matter makes intuitive sense and matches our predictions, although it does not match the relative lack of passion with which these “humdrum” factors are discussed in the popular press. Despite whatever reservations we may have about the size of our sample, or our inability to control for the potential influence of other factors, the strength and significance of these relationships suggest that only perceptions of corruption and inflation are likely to provide fruitful ground for future research on the Arab Spring.²⁶



Conclusion

The upshot of these analyses is not that the likely suspects do not matter to the Arab Spring, as at some intuitive or historical level, they must. But rather that we cannot rely on them to explain intraregional differences in the intensity of antiregime violence. We, like most political observers, firmly believe that the factors we have identified must be, at some level, causes of the Arab Spring. But that, for the moment, is an article of faith. Statistically and scientifically speaking, the jury is still out. And this lack of confidence in our findings should both inform our foreign policy and compel our scholarship to take account of other intraregional peculiarities and case-specific factors.

That said, if our conclusions about the importance of corruption are an accurate reflection of reality on the Arab street, then what brought people to those streets in 2011 was not so much the absolute magnitude of their suffering (unemployment or poverty) but rather, the degree to which they perceived themselves to be suffering at the hands of a corrupt ruling elite.²⁷ It is, therefore, no less unsettling but all the more appropriate that the uprising in the Arab world began when Mohamed Bouazizi — a Tunisian fruit vender who had been poor all his life — killed himself to protest mistreatment at the hands of corrupt authorities. Our conclusions suggest that his desperate act had such dramatic repercussions because ordinary people around the Middle East shared his plight.

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Notes

1. We acknowledge, at the outset, the difficulty of establishing conclusive findings in a field of only 17 or so cases. Thus, we view all of our results (even those that appear to be statistically significant) as preliminary in nature. We hope, however, that our conclusions will direct future research in a productive and more methodologically rigorous direction.
2. It is doubly appropriate that Ted Robert Gurr's *Why Men Rebel*, a pioneering study of relative deprivation and social upheaval, has recently been translated into Arabic (2010). It is perhaps triply appropriate that he recently blogged about the work's continued applicability (2011).
3. Lynch, "Obama's 'Arab Spring?'" (2011a, p. 1). Similar arguments were later made by Friedman (2011, 2012a, 2012b) and Elgendy, "Arab Spring: Causes & Role of NSOs" (2012, pp. 6–7).
4. See Hounshell (2012: 3). For an alternative view, see Robertson (2013, *passim*).
5. Transparency International (TI) publishes a Corruption Perceptions Index (CPI), which defines corruption as "the abuse of entrusted power for private gain." Countries are scored on a scale of 1–10, with 1 being the most corrupt. For more on TI's mission and methodology, see http://www.transparency.org/whoweare/organisation/faqs_on_corruption. For the 2010 index we used in this study, see <http://www.transparency.org/cpi2010/results>.
6. Interestingly, the number of scholars arguing that social media were not a significant cause of the Arab Spring seems to exceed the number of commentators who actually point to this



factor as significant. That said, “Effect of Social Media on the Arab Spring” is the only potential cause of the revolution to have a dedicated section on the Wikipedia entry for “Arab Spring” (n.d.). Retrieved August 13, 2013, from http://en.wikipedia.org/wiki/Arab_Spring. So, if we take “Wikipedia-attention” as a measure of conventional wisdom, the scholarly effort to “debunk” this factor might be justified. Still, there seem to be more people worried that “other people” might mistakenly believe in the power of social media than people who actually believe in it, and this is curious.

7. In this sense, our work can be seen as a response to the important work of Lynch, who argues that “Rigorous testing of competing hypothesis about the impact of the new social media will require . . . new kinds of data analysis not traditionally adopted to Middle East area studies” (2011b, p. 301)
8. Gelvin is similarly skeptical of arguments that appeal to “transnational” factors to explain country-specific forms of unrest (2013, pp. 360–364).
9. For more on the overlooked virtues of negative results in social science, see Lehrer, Leschke, Lhachimic, Vasiliud, and Weiffen, (2007). See also Lynch (2012).
10. For example, Iran (along with Israel) is featured on the fascinating interactive graphic timeline that was published by the Guardian and is available online <<http://www.guardian.co.uk/world/interactive/2011/mar/22/middle-east-protest-interactive-timeline>>.
11. In principle, there is no reason that our methodology and analysis could not be applied beyond the confines of the “Arab World,” strictly defined. Indeed, some of our likely suspects might constitute global risk factors for political and social unrest. However, given that one of our primary purposes is to test the impact of media (like Al Jazeera and Twitter) on the recent upheaval, we thought it best to limit our study to the single, socio-linguistic network of countries where Arabic is the primary language of government, commerce, and political activism.
12. There are numerous mechanisms by which ethnoreligious heterogeneity might lead to increased levels of unrest: 1) As noted above, ethnic and socio-economic lines tend to overlap and reinforce one another. The Shi’a in Bahrain, like the Sunni in Syria and Iraq, are often overrepresented among the poor and disenfranchised in their countries, making ethnic and economic resentment difficult to distinguish; 2) ethnic divisions often exacerbate clientelism, especially in the rentier states of the Middle East. In his study of economic underdevelopment in Africa, Collier notes that citizens and governmental elites are often “more attracted to programs of ethnic favoritism than to national public good” (2008, pp. 204–205). Berman applies this logic to the dynamics of the Arab Spring specifically, noting that authoritarian regimes often “manipulate and deepen communal cleavages to divide potential opponents and generate support among favored groups” (2013, p. 65); 3) ethnic fissures often exacerbate political unrest because the mere prospect of regime change can lead to a dynamic where rival ethnic groups jockey for influence, security, and power. (For an application of this dynamic in Lebanon, see Salem 2014, p. 623.) In short, ethnic, religious, and racial diversity has a tendency to reflect and to exacerbate the very tensions that may be at the heart of political protests everywhere, from the Middle East to Ferguson, Missouri.
13. See Lijphart (2012, p. 66). For example, despite a tiny Christian minority (1% of the total population), most observers would describe Morocco as ethnically homogenous. While technically incorrect, describing the country as homogenous does not so much ignore the country’s ethnic minority as it acknowledges the minority’s political insignificance. In Yemen, conversely, the Shi’a minority makes up over a third of the country’s population (37.5%). In terms of its political power and ability to cause unrest, Yemen’s ethnic minority is clearly



more significant than Morocco's. But given that, technically speaking, both countries are religiously divided into two religious groups, how are we to compare them objectively? By returning ethnic heterogeneity scores of 1.02 in Morocco and 1.88 in Yemen, Laakso, and Taagepera's equation allows us to make comparisons that are both objective and consistent with our intuitive sense of the countries' demographic characteristics.

14. Sources: Religion figures given by CIA World Factbook. Where Sunni/ Shi'a breakdown not given, I have used the Pew Forum on Religion & Public Life's report, "Mapping the Global Muslim Population" (Pew Research Center, October 2009).
15. "Median Age" comes from the CIA World Factbook, 2012; "Percent under 25" comes from The Economist <<http://media.economist.com/sites/default/files/media/2011InfoG/Interactive/Arabmap2311/Arab.swf>>; "Percent 15-29" comes from the United States Census Bureau <<http://www.census.gov/population/international/data/index.html>>. All were accessed online in 2012.
16. To be sure, this is a somewhat crude and oversimplified analysis of a remarkably complex factor. In actual fact, there's an entire literature on the circumstances under which unemployment might (or might not) contribute to social unrest. Campante and Davin, for example, argue convincingly that the dangerous factor for the governments of the Middle East was not unemployment alone, but rather, the flammable cocktail of "rising levels of education and poor job prospects — particularly for the relatively skilled" (2012, p. 174). Likewise, Ragui Assaad writes about an "enduring legacy of dualism" in Arab labor markets, where rapid increases in educational opportunities have increased demand for highly coveted but relatively limited jobs in the lucrative public sector. This, in turn, has disrupted the "authoritarian bargain," leaving already-overstretched regimes without enough well-compensated public sector jobs to hand out to (and thereby appease) politically salient groups (2014, pp. 1-2). We firmly believe that interaction effects among education, class, and different types of unemployment constitute a promising avenue for future research. But here too, good data about different types of unemployment are even scarcer than satisfying job prospects for the Arab world's rising middle class. The lack of good data presents yet another challenge for those wishing to investigate the very real interactions between unemployment, education levels, and the propensity for social unrest in the modern Middle East.
17. While the Gini score is the most common way of operationalizing income inequality, the statistic is not without its problems or detractors. Given the lack of uniformity in structural conditions among states, and methodological paradigms among researchers, the data are difficult to compile, seldom complete, and of questionable validity [see De Maio, 2007]. Where available, we have taken Gini statistics from the World Bank (<http://data.worldbank.org/indicator/SI.POV.GINI/>, accessed July 2014). Where data were missing from this source, we had no choice but to get our data from Wikipedia: <http://en.wikipedia.org/wiki/List_of_countries_by_income_equality>, accessed July 2014. Wikipedia lists its source for these data as the 2012 Global Peace Index (GPI), which references Gini data, but does not provide a country-by-country list. The GPI source itself cites the 2011 UNDP Human Development Report and the Economist Intelligence Unit as sources [p. 126]. We have investigated these sources but, as yet, have not been able to confirm the data independently.
18. Curves like this, sometimes known as Kuznets Curves, have been used to describe a diverse array of dynamic systems. The original work of Simon Kuznets himself even focused on economic inequality — albeit as a dependent variable. He suggested that, in the course of economic development, initial increases in per capita income would be met with increases in inequality. As industrialization continues, however, wages rise and inequality eventually falls.



- Economists have also conceptualized an Environmental Kuznets Curve, describing the relationship between economic development and environmental degradation.
19. Data for Internet access come from the Economist Intelligence Unit. Mobile-cellular data come from the International Telecommunications Union <<http://www.itu.int/en/ITU-D/Statistics/Pages/default.aspx>>.
 20. Source: The Dubai School of Government's Arab Social Media Report (ASMR), Volume 1: Number 2 ("Civil Movements: The Impact of Facebook and Twitter," May 2011). An "active Twitter user" is defined as someone who used Twitter at least once during a two-week period between January 1 and March 30, 2011 [p. 15].
 21. Al Jazeera penetration data come from an online report by the Allied Media Corp. <http://www.allied-media.com/aljazeera/al_jazeera_viewers_demographics.html> (accessed June 2012). The Al Jazeera penetration rate for Mauritania was unavailable.
 22. Literacy data come from the Economist Intelligence Unit. They are calculated as a percentage of the population, that is, 15 years or older.
 23. For a qualitative argument for the importance of corruption in the formulation of antiregime sentiment in the Middle East, see Hollander (2013, p. 2).
 24. In this, our conclusions echo those of Aday et al., who conclude that Twitter was "broadly useful" for onlookers outside the Middle East but "less so for protesters on the ground" (2013, p. 1).
 25. In fact, when we control for GDP per capita, the apparent statistical significance of Al Jazeera penetration goes away completely ($p < .203$).
 26. For a fascinating investigation as to the primacy of political factors, see Wolfsfeld, Segev, and Sheaffer's article, "Social Media and the Arab Spring: Politics Comes First" (2013).
 27. For more on relative deprivation as a possible cause of unrest in the region, see Daniel Bischof's *Why Arabs rebel: Relative deprivation revisited* (2012). For more on the emotional microfoundations of the Arab Spring, see Wendy Pearlman's "Emotions and the Microfoundations of the Arab Uprisings" (2013).

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