# The Dictator's Dilemma

## The Role of Social Media in Revolutions

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*Abstract: This paper develops a revolution model incorporating the effects of social media. It is seen that social media changes the outcomes of traditional revolution models due its effects on the cost/benefit analysis of would-be participants. The paper also considers various strategies for the dictator to stop the revolution in light of social media. Finally, the paper offers extensions and different ways to evaluate the effectiveness of social media in a revolution*

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## Introduction

So, you want to be a dictator? These days, it is tougher to lead an authoritarian regime in the face of democratic ideals, free speech and globalized media. Look to the Arab Spring, the inspiration for this paper, as an example of dictators overthrown by these modern forces. Rebels mobilized in Tunisia, Egypt and Libya against longstanding dictators to achieve a self-determined life. This paper hopes to find ways to help you, the would-be dictator, stay in power. In order to do this, the paper will explore and model the factors that encourage the overthrow of a dictator and hence inform how the dictator can rebuff any rebellions *before* they start.

All revolutions differ; perhaps, however, modern and future revolutions have fundamentally changed due to the internet and social media. The greatest problem for would-be revolutionaries is organization. Social media helps overcome collective action problems by dissemination of information to organize people. Facebook and Twitter brought people to Tahrir Square in Egypt to protest Hosni Mubarek because they were inspired by posted messages and videos. Wael Gholim created a Facebook page "We Are All Khaled Saeed" that created an online arena for people to share their discontent. When the page called for protests on January 25th, hundreds of thousands mobilized.[1]

Social media has also changed the effectiveness of the dictator's methods to quell a revolution. In the past, a dictator could kill a dissident to silence him while only angering a few close relatives and friends. Today, as in the case of Khaled Saeed, the deceased can become a rallying cry for thousands and his message quickly spread. The dictator's action, while silencing one, angers thousands. Since the revolutionaries' tactics have changed, perhaps the dictators need to as well. In some Asian countries, authoritarian regimes restrict internet access such as China's "great firewall".[2] Pakistan has decided to build its own web wall to partially block users from certain websites while North Korea effectively does not have internet.[3] Restricting the internet involves a trade-off between the internet's efficiency gains and the possibility of social unrest.

Of course, there is always the good old-fashioned bribe. The problem is enforcing the bribe. Hopefully, the bribe is not taken and then used against the dictator. Instead of a cash bribe, the dictator could employ or create governmental positions for his opposition. This co-option of leading revolutionaries may help kill a revolution before it starts.[4] Perhaps the best method of keeping a revolution at bay is to make the people happier by governing better.

The dictator has many choices to stop a revolution; some more effective than others. In order to examine the dictator's choices, a revolution model needs to be constructed.

[1] http://en.wikipedia.org/wiki/2011_Egyptian_revolution
[2] Hachigian 2002
[3] http://www.nytimes.com/2012/03/03/technology/pakistan-builds-web-wall-out-in-the-open.html
[4] Gandhi and Prezeworski 2007; Acemoglu and Robinson *Economic Origins of Dictatorship and Democracy*

**A model revolution**

Suppose we are in the country Kahndukestahn. There are **N** people living in Kahndukestahn led by Duvidoff Cutvich. There are some proportion **λ** of people who are unhappy. To begin, **λ** is exogenously determined and on the interval [0,1].[5] Some of the unhappy people might always be unhappy regardless of the government and leader. Other people might be made unhappy due to the policies and actions of Cutvich. Thus, we have a number $\mathbf{N_U = \lambda N}$ of people unhappy with the current regime.

The next consideration for any unhappy person is to decide whether or not to become an active dissenter. A person will become active if the benefits outweigh the costs:

(1) $$\boldsymbol{\rho^i \cdot x_A^i > (1-\rho^i)c + q(e,f)}$$

And inactive if:

(2) $$\boldsymbol{\rho^i \cdot x_A^i \leq (1-\rho^i)c + q(e,f)}$$

where $\mathbf{x_A^i}$ is the benefit of a successful revolution for an active rebel; **c** is the cost of a failed revolution;[6] and **q(e,f)** is a cost function associated with recruiting revolutionary participants. Throughout, risk neutrality is assumed. The cost of recruitment is an increasing function of the effort, **e**, and a decreasing function of the effectiveness, **f**. Finally, $\boldsymbol{\rho^i}$ is the individual's perceived probability of a successful revolution to whose determinants we will return later. This decision by each person in the group $\mathbf{N_U}$ results in two other groups: $\mathbf{N_I}$ and $\mathbf{N_A}$ for inactive and active. The members of group $\mathbf{N_A}$ reveal themselves to the dictator. The members of group $\mathbf{N_I}$ are hidden revolutionaries pretending to agree with Cutvich and his government.[7] It is somewhat unnatural to assume all $\mathbf{N_A}$ are revealed to Cutvich, but simplifies the discussion.[8]

Cutvich now faces a choice of whether to 'bribe' or not 'bribe' the active revolutionaries. The term 'bribe' is currently used loosely to encapsulate any action the dictator can engage such as kill, cash bribe, or offer a job. If Cutvich doesn't bribe, the number of active revolutionaries remains the same. If he does bribe, some number of active rebels become inactive (not necessarily happy). Thus, a number $\mathbf{N_A'}$ will result where:

(3) $$\mathbf{N_A \geq N_A'}$$

A full consideration of the bribes will be in the next section. Intuitively, however, Cutvich can reduce the probability of a successful revolution, reduce the payoffs, increase the costs or increase the cost of recruiting participants. In terms of the model, Cutvich can affect either $\boldsymbol{\rho^i}$, $\mathbf{x_A^i}$, **c** or **q(e,f)** at a cost to him.

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[5] The inspiration for this model comes from Besley and Prat 2006. In that paper, the authors develop a model of media capture. The initial idea was to extend media capture to revolutions, social media and dictatorships. Eventually, the paper evolved into a 'how-to' manual for dictators.

[6] This is a simplification of Tullock 1973

[7] This idea of latent and active revolutionaries comes from Kuran 1989

[8] Detection costs complicate the matter. If detection costs exist, the perceived cost of joining the revolution is lower than the actual cost. The lower perceived cost results in more active revolutionaries than optimal. Detection costs might also change the dictator's responses. In order to weed out active revolutionaries, he may just punish everyone. This causes non-active punished people to help the dictator find active revolutionaries.

The active revolutionaries *recruit* the inactive revolutionaries to the cause which results in a certain number of revolutionaries $\mathbf{N_R}$. The number recruited is a function of the cost of recruitment **q(e,f)** and the number of active revolutionaries $\mathbf{N_A}$:

(4) $$\mathbf{N_R = F(q(e,f), N_A)}$$

The function **F( )** is decreasing in **q(e,f)** and increasing in $\mathbf{N_A}$. Thus, if Cutvich hopes to reduce the number of people against him, he wants to affect the number of active revolutionaries and their ability to recruit participants.

The people recruited, $\mathbf{N_R}$, also face a decision to join the revolution. Since the people recruited are not visible to Cutvich, these people cannot be 'bribed' directly.[9] The decision to join is similar to the cost benefit analysis of an active revolutionary. A risk-neutral person who has been contacted will join if:

(5) $$\boldsymbol{\rho^i \cdot x_I^i > (1-\rho^i)c}$$

And not join if:

(6) $$\boldsymbol{\rho^i \cdot x_I^i \leq (1-\rho^i)c}$$

The main difference between this choice and the active rebel's choice is the lack of **q(e,f)**. The inactive revolutionary doesn't face this additional cost because they are not in charge of coordinating the revolution. This decision is solely based on the potential benefits and costs. Also, we assume the benefit for joining the revolution at this stage is less than the one for an active revolutionary: $\mathbf{x_A^i > x_I^i}$. Intuitively, this assumption holds because if people didn't feel the benefit was much greater to them, they would not risk revealing themselves to the dictator. Only those who foresee the greatest benefit will become active revolutionaries. Also, the active revolutionaries will become the leaders if the revolution succeeds increasing their perceived post-revolution benefit.

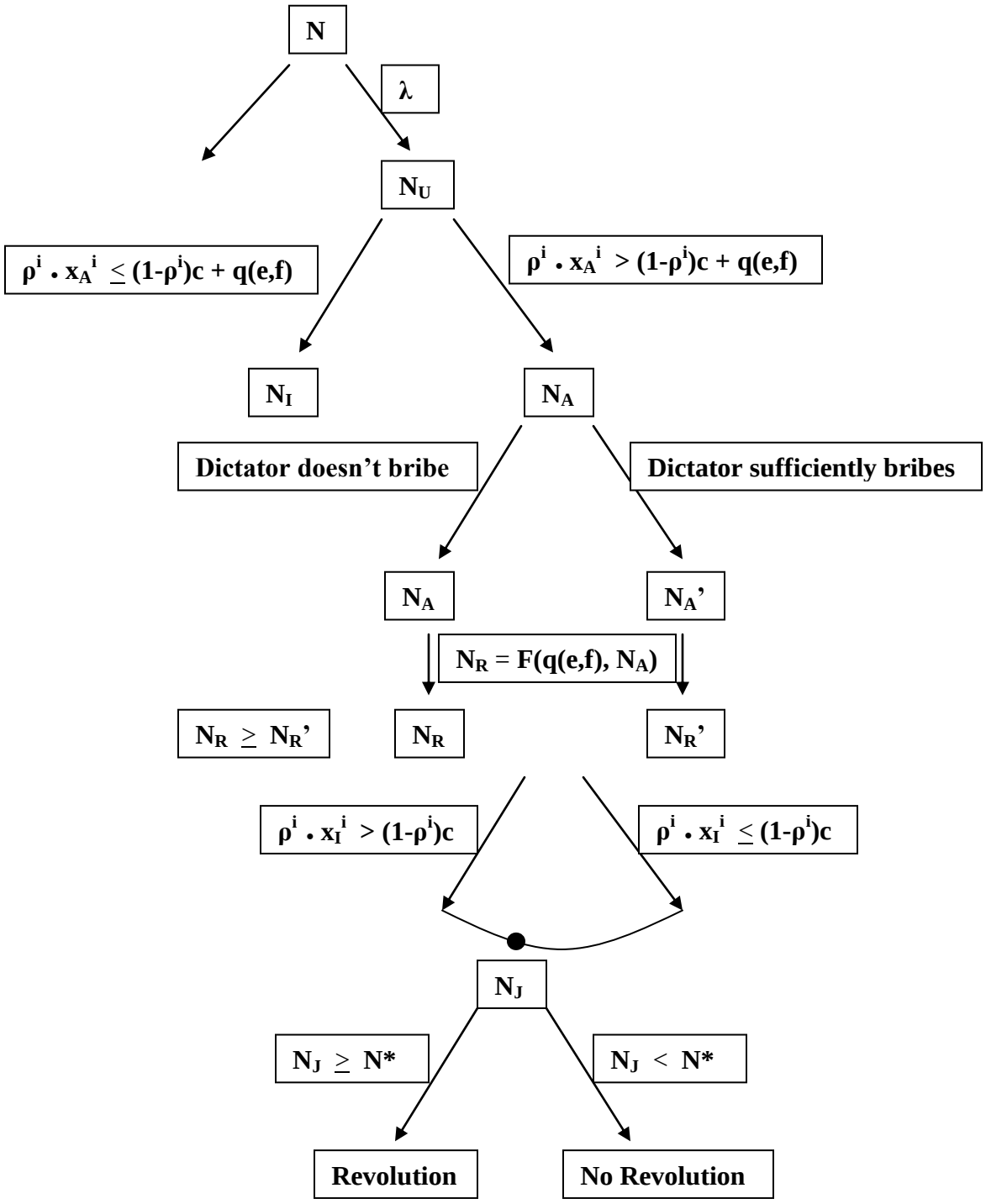
After this cost/benefit analysis, a number of joined rebels will result: $\mathbf{N_J}$. These people are committed to the revolution and cannot free-ride. The group $\mathbf{N_J}$ consists of active revolutionaries and recruited inactive ones. A free-rider problem does not exist because active revolutionaries have *convinced* people to join them. An inactive revolutionary is not a free-rider because they have been persuaded to join the revolution. People who decide to not join the revolution are still technically free-riders. By assumption, for a revolution to occur, there needs to be a critical value of people: **N***. A revolution will result in Kahndukestahn if:

(7) $$\mathbf{N_J \geq N^*}$$

The moves of the game are best summarized in Figure 1. Now that we have our model revolution, we can examine when the dictator will bribe, the effect of social media and Cutvich's best options to stay in power.

[9] It would be possible to bribe these people indirectly through government aid programs or construction of new infrastructure. However, this is much more costly than directly 'bribing' the active revolutionaries and will be regarded as impossible.

Figure 1:


N
λ
$N_U$
$\rho^i \cdot x_A^i \leq (1-\rho^i)c + q(e,f)$
$\rho^i \cdot x_A^i > (1-\rho^i)c + q(e,f)$
$N_I$
$N_A$
Dictator doesn't bribe
Dictator sufficiently bribes
$N_A$
$N_A'$
$N_R = F(q(e,f), N_A)$
$N_R \geq N_R'$
$N_R$
$N_R'$
$\rho^i \cdot x_I^i > (1-\rho^i)c$
$\rho^i \cdot x_I^i \leq (1-\rho^i)c$
$N_J$
$N_J \geq N^*$
$N_J < N^*$
Revolution
No Revolution

**The social media effect**

From equations (5) and (6), some proportion $\gamma$ of people recruited will decide to join the revolution:

(8) $$\gamma \cdot N_R = N_J$$

The $\gamma$ depends on each individual's calculus and predicted probability of winning. Thus, the $\gamma$ can be understood as a measure of the 'climate' for a revolution. There could be any number of reasons to join the revolution such as people's dislike for Cutvich, a young and restless population, or an injection of new cultural ideals. If the conditions are ripe for a revolution, we would see a higher $\gamma$. In Czechoslovakia's Velvet Revolution of 1989, conditions such as economic malaise and the government's reluctance to punish dissidents caused more people to join the rebellion. The same year's Tiananmen Square protests had far less people. The Chinese government was much stronger than Czechoslovakia's and strongly discouraged joining the dissidents—the cost to join was too high. Alternatively, The Tiananmen Square protests could have also failed because the Chinese successfully restricted information or the revolutionaries were too dispersed. In this model, the $\gamma$ captures all these factors surrounding each individual's choice to side with the active revolutionaries or not.

Something omitted until now is the form of the perceived probability of success. Since a successful revolution depends on a critical number of people, a person would perceive the probability of a successful revolution as the expected number of people to join:

(9) $$\rho^i = K\,(E[N_J])$$

Substituting in equations (8) and (4):

(10) $$\rho^i = K\,(\gamma \cdot F(q(e,f), N_A))$$

Thus, an individual's perceived probability of success is a function the climate, cost of recruiting and the number of active revolutionaries.

The introduction of social media reduces the cost of recruitment and organization of revolutionaries through an increase in the effectiveness of recruiting, **f**. This direct effect of increased effectiveness will increase the perceived probability of success.[10] With greater frequency of messages from active revolutionaries, people will believe in a successful revolution. An average discontented person in Egypt heard the message to organize a protest on January 25th. They also expected more to join because of social media's ability to coordinate people in a safe online environment before actively protesting. The "We Are All Khaled Saeed" Facebook page had over 400,000 members. When a member received the call to protest, that person knew 400,000 people did as well and his or her expectation of $N_J$ was much higher than without social media.

[10] Since **q( )** is a decreasing function of **f**, an increase in **f** will reduce **q( )**—a reduction in cost of recruitment due to an increase in efficiency. Also, since **F** is a decreasing function of **q( )**, the increase in **f** will increase **F**. The increase in **F** will increase $\rho^i$ by a factor of $\gamma$.

Social media will also have an indirect effect on $\boldsymbol{\rho^i}$ through the number of active revolutionaries. The decision to become an active revolutionary depends on the cost of recruiting—a reduction in this cost causes more people to become active.[11] In the case of Egypt, bloggers and Facebookers, who probably are not Che Guevara, found a voice through social media. In past revolutions, the organizers of the Egyptian revolutions would probably not be active dissidents. However, due to the ease and effectiveness of social media, people like Wael Ghonim decided to speak out and made an impact.

The combination of these effects can explain why the Arab Spring exploded into existence. The introduction of social media drastically decreased **q(e,f)**. The decrease has two effects on equation (1): decrease the cost side of the function and increase the benefit side. More people become active which means more people will be recruited and will join. More people deciding to join will cause more to become active and the cycle will repeat. Thus, we get this spiral effect of social media where the number of people joining explodes towards the critical value. More rigorously, we have two stable equilibria with an unstable tipping point in between. At one of the equilibriums, the dictator is in firm control. There are not enough active revolutionaries to recruit and the critical number, **N***, is not reached. At the tipping point, we begin to meet our conditions for a revolution: the active revolutionaries grow quickly in numbers and effectiveness. This increases the contacted inactive revolutionaries and it pushes towards the second equilibrium: revolution. It seems odd to call the second equilibrium 'stable' because it is a revolution. But, this model does not take us beyond the revolution and whether it is successful. It only helps to determine whether there will be a revolution.

The spiral effect and multiple equilibria are due to the fact that perceived probability of success depends on the active people while the active people depend on the perceived probability of success. Thus, the $\boldsymbol{\rho^i}$ and $\mathbf{N_A}$ reinforce each other which will cause an explosion towards **N***. Of course, the two can negatively work together and the resistance will quickly cease.

## Cutvich's bribe strategy

Given the effects of social media, it seems that Cutvich and future dictators are in trouble. Primarily, Cutvich needs to ensure the number of people that join is below the critical value for success. The only way the dictator can affect the outcome is through the number of active rebels and their contact with inactive rebels. From equation (8), the dictator will *want* to 'bribe' if:

$$\mathbf{N_J = \gamma \cdot F(q(e,f), N_A)) \geq N^*} \tag{11}$$

Equation (11) is the bribe necessity constraint. Thus, Cutvich will want to 'bribe' in some manner to reduce the number active revolutionaries. By reducing the number of active revolutionaries, Cutvich reduces the perceived probability of success and the number of people reached. If Cutvich can successfully reduce $\mathbf{N_A}$ to a number $\mathbf{N_A'}$ which satisfies:

$$\mathbf{\gamma \cdot F(q(e,f), N_A')) < N^*} \tag{12}$$

[11] Since **q( )** is a decreasing function of **f**, an increase in **f** will reduce **q( )**—a reduction in cost of recruitment due to an increase in efficiency. This will reduce the right hand side of equation (1): $\boldsymbol{\rho^i \cdot x_A^i > (1-\rho^i)c + q(e,f)}$. This reduction causes more people to join. Since $\mathbf{N_A}$ increases, $\boldsymbol{\rho^i}$ will increase by a factor of $\boldsymbol{\gamma}$.

he will remain in power. Whether Cutvich will want to bribe or not is less interesting than whether he can actually bribe and which bribe is most feasible. Different kinds of bribes will produce different results and be more or less effective at reducing $\mathbf{N_A}$. Thus, the number of people who stop being active revolutionaries is a function of the bribe:

(13) $$\mathbf{N_A - N_A' = \phi(Bribe)}$$

This function defines whether a bribe is actually worthwhile—will the bribe successfully reduce the number of active revolutionaries to satisfy equation (12). Equation (12) is the effectiveness constraint. There are three kinds of common strategies employed by dictators to quell rebellions: kill, bribe or counteract their message. Each of these strategies will have a different effect.

To develop this more fully, a benefit to the dictator, **β**, is introduced. Also, a cost of a bribe to the dictator is needed: **κ**. The benefit is not fully developed in this paper and is assumed as a general benefit from ruling. For instance, **β** might be a function of rents extracted, feeling of power, etc. Thus, the dictator will be willing to bribe if:

(14) $$\mathbf{\kappa \leq \beta}$$

and not bribe if:

(15) $$\mathbf{\kappa > \beta}$$

These equations define the dictator's ability to bribe constraint. For a bribe to actually occur, each constraint, equations (11), (13) and (14), need to be met. Intuitively, the situation must exist where a bribe is necessary to stop a revolution, the bribe is effective at doing so, and the dictator can meet the costs of the bribe.

*Cutvich bribes the rebels*

Perhaps, Cutvich believes the best way to reduce the active number of revolutionaries is through a transfer payment of some kind. Let's assume these transfer payments can range from a cash payment to new housing or even a job in the government. Essentially, the transfer payments seek to make an active revolutionary better off and reduce $\mathbf{x_A^i}$. The reduction in $\mathbf{x_A^i}$ is a result of a person being happier under Cutvich so that a revolution would not be as beneficial as having Cutvich in power. Thus, Cutvich only needs to bribe the person at the point of equality in equation (2):

(16) $$\mathbf{\rho^i \bullet x_A^{i*} = (1-\rho^i)c + q(e,f).}$$

$\mathbf{x_A^{i*}}$ is the value which allows equation (16) to hold. Assume we have an active revolutionary who meets the constraint imposed by equation (1)—his benefit outweighs his cost. The amount required to bribe this rebel is:

(17) $$\mathbf{x_A^i - x_A^{i*} = \kappa}$$

Equation (17) assumes the cost to the dictator, **κ**, is equal to the amount of the bribe. If **κ** is greater than **β**, the dictator will not undertake the bribe. Thus, the dictator will bribe those individuals such that:

(18) $$\mathbf{x_A^i - x_A^{i*} \leq \beta}$$

Of course, this depends on whether we have a situation defined by equation (11). That is, whether the number of active revolutionaries is great enough to cause a revolution. It also depends on whether the bribe is effective from equation (13).[12]

From this discussion, we can see that there are some people who cannot be bribed by Cutvich—their $\mathbf{x_A^i}$ is too high and equation (18) cannot be satisfied. Assume we are in a situation where the number of active revolutionaries is sufficient for a revolution to occur and the dictator can bribe them to stop the revolution; defined by equations (11), (13) and (18). Will a reduction in $\mathbf{x_A^i}$ through bribe transfers actually reduce $\mathbf{N_A}$ to $\mathbf{N_A'}$ to successfully stop a revolution? It is conceivable that a cash transfer might actually raise $\mathbf{x_A^i}$. The transfer payment can incentivize activism amongst the unhappy people because only the active people are eligible for the transfer. The transfer payment is more expensive for the dictator because more people decide to join. In the extreme sense, all the unhappy people have an incentive to become active because they will be compensated back to inactive status. Thus, if transfer payments were the only form of bribe, Cutvich would be in trouble because he would need to compensate every unhappy person at a high cost to him. The transfer payments signal the dictator's weakness. This signal would encourage more people to be active and eventually topple the dictator.

*Cutvich kills the rebels*

Killing would-be revolutionaries is a common tactic for dictators. The same occurs as before: we must be in a situation where a bribe is necessary as defined by equation (11); the bribe effectively reduces the active revolutionaries, equation (13); and the benefit of ruling exceeds the cost of the bribe, equation (14).

In this method, the dictator directly reduces the number of active revolutionaries to below the possibility of a revolution by killing them. This time, the cost to the dictator is a function of the number of people he needs to have killed:

(19) $$\mathbf{\Omega = \Omega (N_A - N_A')}$$

As before if:

[12] This discussion changes if we allow people to be 'prospect' utility maximizers as from Kahneman and Tversky 1979. In prospect theory, people value gains and losses rather than the final outcome. Essentially, the model in this paper does not hold if people are prospect utility maximizers. This model is based on potential outcomes of the revolution as to whether people will decide to join the revolution or not. However, we can still consider the idea. Suppose Kahndukestahn is an awful place to live. For years, Cutvich has been siphoning off resources from the country and the people live in abject poverty and are starving. If this were the case, the benefit of a revolution would be absolutely enormous for everybody. Everybody would have an incentive to become an active revolutionary and a revolution would precipitate quickly. Also, it would essentially be impossible for Cutvich to bribe because their $\mathbf{x_A^i}$ would be astronomically high. However, if people are 'prospect' utility maximizers, it might be possible for Cutvich to bribe at a very low cost. Since people are starving and extremely poor, the occasional crust of bread or small monetary payment might be adequate to decrease their desire to be a revolutionary. Thus, prospect theory changes Cutvich's ideal bribe strategy. Cutvich's new optimal strategy will be to severely oppress his people and extract large amounts of rents. This oppression will make any sort of bribe look attractive and convince people that revolution is not necessary. Using this strategy, Cutvich will enjoy an enormous benefit from ruling and minimize his amount of bribe payments.

(20) $$\Omega\,(N_A - N_A') \leq \beta$$

the dictator will be able to stop a revolution. This method, however, has two different effects on the overall game. The first effect, the one desired by the dictator, is to raise the cost of becoming an active revolutionary. More formally, **c** becomes a function of the probability that an active revolutionary is killed multiplied by the additional cost.

(21) $$c' = c + ((N_A - N_A') / N_A)\delta$$

The new cost to the active revolutionary, **c'**, equals the cost plus the probability that an active revolutionary is one of the people killed.[13] The **δ** is the cost of being killed.[14] Killing active revolutionaries introduces a new larger cost into the unhappy persons' decision to become active or not. We can see that if the dictator needs to kill a lot of people—$(N_A - N_A')$ is large—the cost to an active revolutionary will be much higher. This incentivizes people to not become active revolutionaries because it will increase $N_A$ corresponding to a higher cost. We see an 'intimidation' effect where killing not only reduces active people, but also scares people away from becoming active. Because of the 'intimidation' effect we see this method occur in many dictatorships around the world. When Wael Ghonim spoke out against Mubarek in Egypt, he was quickly imprisoned for his denouncement of the regime. This silenced an active revolutionary and also should have scared away more people from becoming active. This 'intimidation' effect, however, is counterbalanced to some degree by an 'unhappiness' effect.

As the dictator kills people, he angers friends and family of the deceased. If these friends and family were previously happy with the government, they will likely turn against Cutvich.[15] Thus, the 'unhappiness' effect encapsulates the fact that people will become more unhappy as more people are killed. Formally, the proportion of unhappy people is an increasing function of the number of people killed or imprisoned:

(22) $$\lambda = \lambda(N_A - N_A')$$

As more people are killed, more people become unhappy leading to the possibility of more active revolutionaries taking the place of the deceased ones. People may become martyrs when they die and a revolution can galvanize around their death.

These two effects leave us unclear as to the effectiveness of the killing method. The 'intimidation' effect reduces the likelihood of a revolution while the 'unhappiness' effect increases it. However, social media substantially changes the game by amplifying the

[13] An interesting extension to this would be to make the probability of getting killed not only a function of the number of people who need to die, but also the activity level of the individual rebel. For instance, the more active the rebel, the more likely he is to die. This would require a discussion of the amount of investment in activity on the part of active revolutionaries.

[14] We assume **δ** is not infinite. Otherwise, the following discussion would be pointless. Given a set of risk preferences, we still see people engage in revolutions despite the possibility of death. Thus, it seems reasonable to assume that even if **δ** really large, people still become active revolutionaries.

[15] It is possible for the dictator to kill people and not generate an enormous unhappiness effect. For one, he could kill the entire family or imprison relatives to reduce the people who may become active rebels. Also, the kill strategy is very intimidating and would probably scare away would-be revolutionaries to offset to a degree the unhappiness effect. If someone's family member is killed because they are an active revolutionary, they may be angrier with the dictator, but the perceived cost of joining the revolution will be much higher.

'unhappiness' effect. For example, the violent crack-down on Tunisian rebels was spread across social media sites in order to recruit more people to the cause. In Libya, the documentation of atrocities against rebels by Gaddafi with social media sites helped stir western sentiments and involve the UN in the civil war. Thus, the effectiveness of brutality and intimidation has decreased with the rise of social media. For Cutvich to hide the fact that he has killed people in order to maintain control will be nearly impossible with social media. Thousands more people will quickly find out and turn against Cutvich. Social media keeps the dictator accountable and reduces the use of violence against his own people due to the amplification of the 'unhappiness' effect.

*Cutvich censors the rebels*

The method of censoring the rebel message has become increasingly popular given social media's effect on coordinating participation in a revolution. China has built the 'great firewall' while North Korea has completely shut-off the internet. Other countries such as Pakistan are currently building internet filtering programs. In an increasingly connected and complex internet world, these strategies may prove futile, but the purpose of these efforts is to increase the cost of spreading the message by decreasing the effectiveness of social media. However, censoring the internet involves a trade-off between utilizing the commercial advantages afforded by the internet with the dangers of empowering would-be revolutionaries. As an economy expands, the efficiency gains of the internet will increase. This makes it more expensive for the dictator to censor the internet. However, with economic growth, the population might be less willing to revolt because the country is doing well.

Let's assume Cutvich wants to build a firewall restricting internet usage for active revolutionaries. This increases the **q(e,f)** portion on the cost side for the active revolutionary. This makes it less attractive for an unhappy citizen to become an active revolutionary. The second effect of the censoring method is to decrease $\mathbf{N_R}$. This is the first method to affect not only the number of active people, but also the number of people recruited through social media. Thus, Cutvich is able to indirectly affect the inactive revolutionaries through censorship.

Censorship does not have the same negative externalities associated with killing people. To some degree, censorship does increase the number of unhappy people because they want freedom. However, this effect is much smaller in comparison with the 'unhappiness' effect associated with killing people. In fact, if censorship is strong and manipulative enough, people might not even know the things they are missing. In China, many people are oblivious to the fact that their internet is censored and things like Tiananmen Square protest even existed. The greatest issue facing censorship of the internet is the productivity loss. The internet facilitates interaction and more effectively delivers buyers to sellers and reduces transaction costs. Censorship reduces the gains realized by the internet to a certain degree. Of course, the censorship program can be built in an optimal way to reduce these losses and maintain much of the efficiency gains from the internet. Because censorship does not have the negative impact associated with the killing method and less costly than transfer payments, it has become one of the dominant strategies employed by authoritarian regimes.

Besides just censorship, the dictator can provide misinformation that discounts the rebel message. In this way, Cutvich might be able to counteract the effectiveness of the recruitment **f**. This would similarly increase the cost of **q(e,f)**. The cost of providing misinformation and

discounting the rebels is cheaper than building a firewall. The effectiveness in comparison to the censorship, however, might be suspect. The effectiveness of misinformation depends on the integrity of the reporting sources. A bribe here or there to encourage reputable media outlets to discredit the rebels might be an effective strategy. In the long run, however, censorship mechanisms such as the firewall probably prove most effective because they can afford more control over the situation. A bribe to a media outlet in the long-run is not always possible or feasible.[16]

## Extensions

There are two basic principles underlying the social media effect in revolutions: accountability and coordination. One of the basic charges for media throughout history has been to keep leaders accountable. Social media allows every person to be a media person and keep dictators more accountable. If a dictator has someone killed, the world will know about it through Twitter and Facebook. Social media also allows for greater coordination. People can more effectively mobilize against a dictator. We can apply these ideas to other areas. We can also model this situation in a different ways.

*A football team*

The structure of a football team is similar to a despotic government. There is a single leader with absolute control, the head coach.[17] Under him, there is a group of assistant coaches and players. Is the social media effect present on a football team? The short answer is yes. Around the country, many coaches have banned the usage of Twitter and Facebook. The reason is simple: the coaches are censoring their teams. Why do they feel the need to censor the team? Because, just like a dictator, the football coach and the program can be embarrassed through social media.[18]

Let's assume a football coach engages in some recruiting violations. Suppose a player on the team tweets about an extra benefit conferred to him through the recruiting process unbeknownst that it was an illegal benefit. Now, this information is public knowledge and the coach will be in trouble. Mike Leach was fired as the head coach at Texas Tech because a player, who felt unfairly treated, tweeted a photo of the inside of a storage shed his coach had locked him in. This sort of punishment was exposed by social media and led to Leach's dismissal. Thus, social media seems to have a similar effect on a football team as it does for a dictatorship. It holds the leader more accountable to his citizens or players.

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[16] Instead of restricting the structural means through which people communicate, the dictator could restrict the language and 'dumb down' the population. For instance, assume the people of Kahndukestan speak Dukie and western ideals and support for the revolutionaries are in English. If Cutvich can successfully reduce the ability of his people to speak English, he can stop the rebels' communication. Threatening ideals would become inaccessible. Also, rebels could not circumnavigate firewall controls as easily because websites in a single and less utilized language would be easier to restrict. This, however, involves similar tradeoffs to the restriction of the internet. Cutvich, in order to keep his place, would reduce the human capital necessary for strong economic growth in Kahndukestan's economy.

[17] For the most part the head coach has absolute control. There are boosters, the athletic director and school president who oversee his performance. For the players of the team, however, he has absolute control.

[18] The head coach of a football team has an image and program's reputation to protect. We have seen an extreme example in the Sandusky case to the lengths a coach will go to protect an image. The restriction of social media is one means to protect the coaches' and programs' reputation.

Of course, on a football team, social media does not influence the coordination of a revolt against the head coach. This seems to be an unlikely circumstance and does differentiate the situations. The key idea, however, is the coach must now pander more to his players or face public humiliation through social media. Around the country, we see stricter adherence to regulations because coaches do not want to be exposed.

*Competing Factions*

A cunning dictator can recognize competing factions and leverage them against each other. Consider a dictator in a country with two subordinate factions. Each of these factions wants to take the dictator's place. However, neither faction is large enough to meet the critical value for a successful revolution **N***. If the two factions could successfully coordinate, they would be able to remove the dictator. While not in power, the factions receive no benefits. If the dictator is deposed, the competing factions will squabble for power—this is assumed to be a better situation for the factions. Even though there is uncertainty without the dictator, there is a chance they reap the benefits of the leadership role. Thus, there exists an incentive for the factions to overcome their differences in order to depose the dictator.

The dictator wants to use the factions against each other to maintain power. It may also be cheaper for him 'bribe' than if the factions did not exist. Essentially, Cutvich only needs to bribe one group. By bribing one group, he gives that group a competitive advantage over the other group. Since the factions compete, Cutvich could actually encourage the destruction of one faction by supporting another. Cutvich could also co-opt one of the factions into his government. This again favors one faction.

Another way Cutvich can spark conflict is through the media. Using the nebulous world of media reports, social media and the internet, Cutvich can rouse up sentiments with misinformation. Cutvich can post messages, posts or tweets through a third party which may be able to spark a conflict between the competing factions.

Finally, Cutvich can persecute one of the factions in favor of the other. This persecution of a group helps to bring the non-persecuted group to his side—they share a common enemy. By creating a common enemy for the dictator and a faction, they essentially become 'friends'. This relationship allows the dictator to maintain power while simultaneously using a faction to defeat the dictator's enemy. Any of these strategies would be more cost effective than bribing, co-opting or killing both factions. The key for the dictator, however, is to be able to leverage and understand the faction politics to his advantage—much easier said than done.

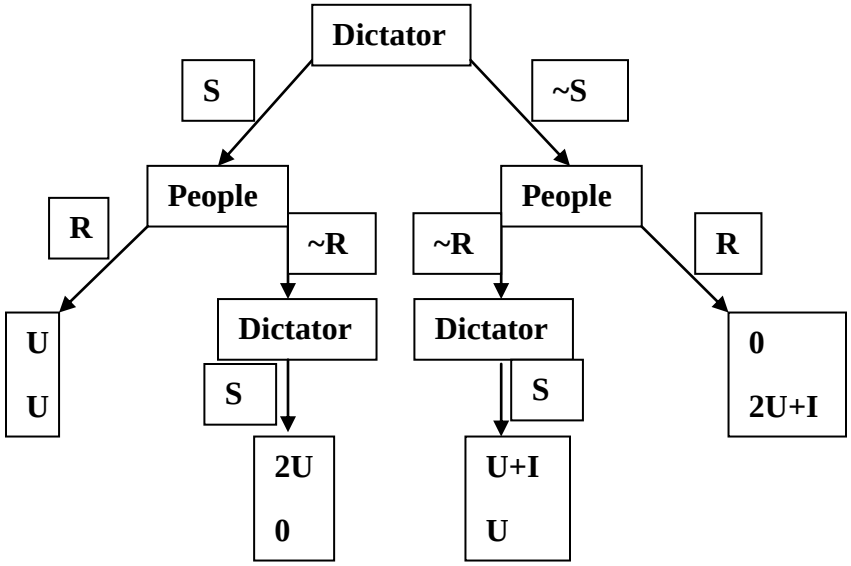
*A two period model*

So far, we have not considered a time dimension in our model. Now, let us extend the model to two periods. Assume we have an exogenously given dictator, Cutvich, in the first period. In this period, Cutvich has a decision to steal, **S**, or not steal, **~S**. If he decides to not steal, the money he would have stolen is reinvested into the country for future benefit. In between the first and second period, the people decide whether or not to revolt. The revolt is based on a simple function:

(23) **R(S,~S, E)**

Thus, the decision on whether to revolt depends on Cutvich's decision to steal or not steal and some exogenous factors. The exogenous factors include everything outside of Cutvich's decision to steal such as population health, economy, demographics and so forth. Thus, it is possible that people will revolt regardless of whether Cutvich decides to steal in the first period or not. It is also assumed that if a revolt is not caused by **E** and Cutvich does not steal, then a revolt will not occur. Essentially, the people know whether they will revolt already or not. The stealing might just be the 'straw that broke the camel's back'. Cutvich has perfect information regarding the **R** function. Finally, the dictator is faced with the same decision to steal or not in the second period if there is not a revolt. If there is a revolt, the game ends with the people in control of period two. Of course, Cutvich will always steal in the second period because it is the end of time. The game is summarized in the following tree:

Figure 2




In each period, the economy yields a utility of **U** to either the dictator or the people. Cutvich will receive **U** utility each time he steals. If the people revolt or Cutvich does not steal, the people will receive **U**. The game is a zero-sum game where the participants split a pie of either **2U** or **2U+I**. The **I** represents the investment in the economy and the extra dividend this will pay in the second period—the pie will be larger in the second period if the dictator does not steal in the first period.

The equilibrium depends on the revolt function of equation (23) and the size of **I**. There are two equilibriums that will result. If revolt is imminent based on the **E**, Cutvich will always steal and the people will revolt. Each participant will get a utility of **U**. Secondly, if a revolution will never occur regardless of Cutvich's actions or if stealing will cause a revolution, he will not steal in the first period if **I** > **U**. Cutvich will receive utility **U+I** and the people utility **U**. Cutvich will not know the size of **I**, however. Essentially, not stealing in the first period presents Cutvich with a gamble which depends on his estimation of **I**.[19] It seems unlikely that Cutvich will not

[19] To further extend this model, a probability of **I** would need to be developed. This concept would also introduce uncertainty and risk into the model.

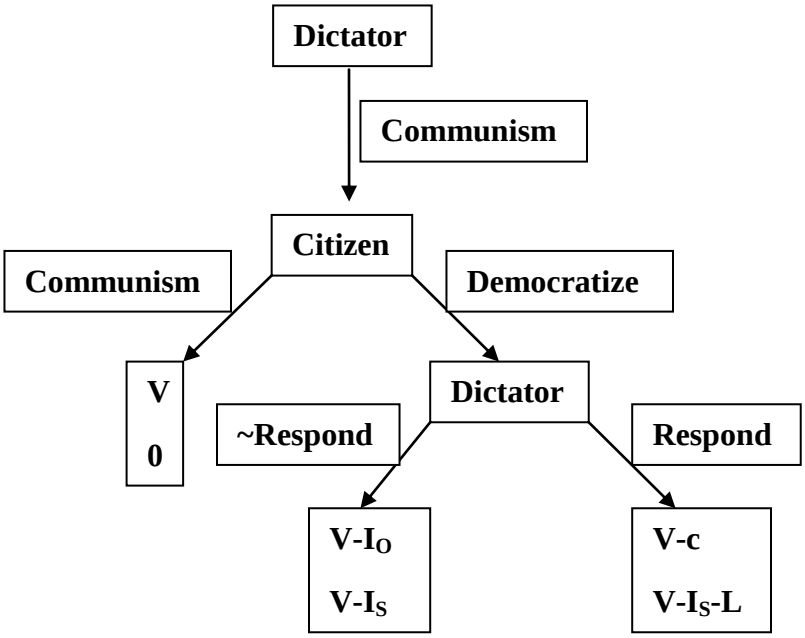
steal in the first period unless he is confident that the reinvestment will be larger than **U** because he can maximize his outcome.[20]

The basics of this model point to the fact that a dictator assesses his longevity in office. If a revolt is going to occur, the dictator will take all that he can in the first period. If, however, the dictator is secure in his office, it might actually be the case that he reinvests into the country only to reap the benefits at a later date.

*The best way for Cutvich to maintain power?*

Perhaps the best way for a dictator to maintain power is best described with a model involving identity construction. This should illuminate the keys to success for some dictators throughout history.[21] To start, suppose we have two agents: dictator and a citizen. Also, there are only two activities: communism or democratization. When an agent follows his preferred activity, he receives a utility **V**; and **0** otherwise. Further, suppose the dictator prefers communism and the citizen prefers democratization. The game is a sequential move game. The dictator has come to power exogenously and will move first by setting the policy of the government to communism—he would never choose democratization in his first move. The citizen can then legitimize his choice of communism or 'rebel' and speak out in favor of democratization. If the citizen chooses democratization, the dictator can respond. The game is outlined below.

Figure 3




The important difference in this model is the introduction of identity into the utility function: $\mathbf{U^j(a_j, a_{-j}, I)}$. Where **I** is a function of not only your actions, but how they correspond to your assigned social category. For instance, if I am a man, I should wear a suit to work. This consideration plays an important role in my identity and utility. Now, in the model above,

[20] It would be interesting to extend this model so that the dictator could steal within a certain range. Essentially, the dictator could take a portion of the economy and the amount he takes would influence the decisions of the people.
[21] This is a natural extension from Akerlof and Kranton 2000

suppose communism is the accepted activity for all the people in Kahndukestahn—it is the activity everyone ought to engage in as the social accepted norm mandated by Cutvich. Thus, when a citizen speaks in favor of democratization, he breaks with the cultural norm and feels an identity loss $\mathbf{I_S}$. Further, when the citizen calls for democracy, Cutvich feels an external identity loss $\mathbf{I_O}$ because his government is losing legitimacy. Cutvich's response to a citizen breaking the status quo incurs a cost to Cutvich but also causes a loss for the citizen.

The best outcome for Cutvich is when $\mathbf{I_S} > \mathbf{V}$: the identity loss from breaking the status quo for the citizen exceeds his utility for following his preferred action. If this was the case, the citizen has no incentive for democratization and a path of 'communism' – 'communism' would result. How can a dictator discover and maintain this equilibrium? Cutvich would want to create a cultural environment emphasizing tradition, strong national identity and harmony. An example can be found in Germany under Hitler. Hitler's rousing rhetoric and fascist state molded a strong national identity. The strong national identity caused the identity loss from going against Hitler's regime too great for most to speak out.

Of course, the dictator can also respond to those citizens who do not legitimize his government. In this case, the dictator might be able to 'block' the citizen from choosing democracy if $\mathbf{c} < \mathbf{I_O}$ and $\mathbf{I_S} < \mathbf{V} < \mathbf{I_S} + \mathbf{L}$. The loss resulting from the dictator's response makes the citizen worse off than if he chooses communism. Under most dictators, the cost is less than the external identity loss so the dictator will respond. Also, the loss associated with the response is generally very high under dictators in order to send a message. Dictators choose to impose high **L**'s (loss of life, imprisonment etc) so as to deter even those who highly value democracy.

Social media, however, might change the game. As more people gain access to the internet, people may begin to realize the value of democracy which could raise **V** and simultaneously lower $\mathbf{I_S}$. As this occurs, more citizens might choose democratize. As more people choose the democracy path, the costs of response may exceed the external identity loss: $\mathbf{c} > \mathbf{I_O}$. This idea may help explain Egypt's revolution. Mubarek, as more people sided against him, could not stop them because the cost was too high. Thus, social media may affect the values associated with the variables and change the equilibrium.

The toughest part of this scenario, however, is actually creating the group identity. What kind of mechanism can Cutvich employ to solidify Kahndukestahn's identity? Perhaps the best way is to recruit talented individuals to the government when they are young. To start, think about the football team extension. The head coach picks a particular team philosophy. From this philosophy, team goals and objectives are set. As new players arrive to the team, they are indoctrinated with 'the way things are done' on such and such team. Similarly, a government can co-opt the youth into the communist party. Cutvich may decide to give national exams. From these exams, the best and brightest are offered positions into his government. These positions are generally good stable jobs. This incentivizes people to buy into communism and form it as part of their identity. Further the exams and incentives create communism as the accepted identity norm.

The difficult part of this extension is to decide how identities are formed. Are they just responses to incentives? Are they innate? Above, we discussed a way that communism can incentivize itself as the national identity. A dictator could also be an appeal to human emotion that can forge communal identity. This builds an innate understanding of identity that doesn't

require incentives. Again, a simple example is the football team. In a game, the 'us against them' mentality creates a team identity. Similarly, wars help bond citizens together. Also, appeals to collective history can build identities. These tasks require a strong and inspiring leader. It may not be possible for everyone to achieve, but inspiring belief can be a powerful tool.

## Conclusion

Social media has brought people, culture and ideas closer together worldwide. People can connect across countries more rapidly than ever before. In this paper, social media changes the political landscape in dictatorships. Dictators must be more accountable to their people because social media facilitates greater cooperation between would-be revolutionaries. The best response of the dictator seems to have changed in light of social media. Many modern dictators have begun to censor their internet in hopes of reducing the effectiveness of social media. Transfer payments and killing civilians might actually hurt the contemporary dictator more than his predecessors.

Perhaps the best response for modern dictators is to utilize social media to his advantage. In the identity construction model, national unity through identity helps the dictator maintain power. If he used social media to help reinforce the national identity, he might be able to maintain power at a very low cost. Dictators need to learn to adapt and overcome the challenges presented by a modernizing world. Using the instruments that aid in ending their reign may help them actually maintain their power.

One area that may provide greater insight into this discussion, and radically change it, is behavioral economics. In footnote 12, there is a brief discussion of prospect theory. This theory provides the basis for all subsequent work in behavioral economics and would drastically change our cost and benefit analysis. Interesting work done on cheating by Dan Ariely could help inform us about the Dictator's decisions to steal or not steal. Ariely's general conclusion is that everyone is susceptible to stealing, but only by a small margin.[22] Behavioral economics could also inform us about the decisions people make to join or not join the revolution. Insights from Kahneman suggest that people are cognitively lazy and prone to snap decision making in various situations. Thus, a decision to join a revolution may not be a result of cost/benefit analysis, but an emotional or subconscious nudge.[23] I think an important area for future work in revolution theory will incorporate psychology and behavioral economics. A formal model could be constructed based more on human's natural cognitive biases, limitations and irrationalities.

[22] Ariely (2012) *The Honest Truth about Dishonesty*
[23] Kahneman (2012) *Thinking, Fast and Slow*

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