The Power of the Street: Evidence from Egypt's Arab Spring*

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Abstract

During Egypt's Arab Spring, unprecedented popular mobilization and protests broke down Hosni Mubarak's government, and ushered in an era of competition between three groups: elites associated with Mubarak's National Democracy Party (NDP), the military, and the Muslim Brotherhood. Street protests continued to play an important role during this power struggle. We show that these street protests are associated with differential stock market returns for firms connected to the three groups. Using daily variation in the number of protesters, we show that more intense protests in Tahrir Square are associated with lower stock market valuations for firms connected to the group currently in power relative to non-connected firms, but have no impact on the relative valuations of firms connected to other powerful groups. Because these results are not driven by changes in formal political institutions or the fall of governments, we interpret them as providing evidence that popular mobilization and protests might have a role in restricting the ability of connected firms to capture excess rents under weak institutions. We also show that social media played an important role in these protests, though they had no direct effect on rents (or stock market participants' perceptions of rents), and further document that the cohesiveness of the opposition as measured from social media activity determines the effectiveness of protests at limiting rents.

JEL classification: P15, G13.

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1 Introduction

From the Arab Spring to the recent uprising against Victor Yanukovic's government in Ukraine, corruption and favoritism have motivated people to pour into the streets to protest against the economic arrangements benefiting politically connected individuals and firms. This paper investigates whether street protests are effective in limiting such rents accruing to politically connected firms.

There are three channels through which street protests can influence economic rents and their distribution. First, if these protests lead to a change in political institutions or regime, this may have repercussions for the extent of rents in the economic system (for example, the fall of a dictator may enable a change in the system of procurement that was previously dominated by a favorite group of firms). Second, even without a change in political regime, street protests may act as a constraint on the extent of corruption and favoritism in the economy, limiting rents (for example, street protests may force the ruling party to reduce corruption or limit favoritism).[1] Third, street protests may cause a redistribution of rents from one group of politically connected firms to another (for example, street protests may destabilize the ruling party, increasing the likelihood that a new group will come to power and become the beneficiaries of an unchanged amount of rents without changing economic institutions).

We use Egypt's Arab Spring as a testing-ground for investigating these questions. On February 11, 2011, Egypt's president, Hosni Mubarak, who had ruled the country as a de facto dictator since his accession to power in 1981, was forced to resign in the face of large protests in the main square of Cairo, Tahrir square. Mubarak's regime was a perfect specimen of economic favoritism and corruption underpinned by the monopolization of political power by a narrow group, centered around his party, the National Democracy Party (NDP). This first phase of the Arab Spring was followed by a period of military rule until June 2012, when the Islamist candidate of the Muslim Brotherhood (a religious-political movement banned under Mubarak's regime), Mohammed Mursi, was elected president. A second period of military rule began in July 2013 after Mursi was deposed in a coup. Mubarak's fall thus provides a window for the study of the first channel above as it involved the fall of a well-established regime. Furthermore, though the second and third channels are inherently difficult to distinguish, we can make some progress by testing whether the rents of firms connected to rival groups increase when the rents accruing to the incumbent group fall. The fact that the military, which was a crucial partner for Mubarak's NDP since 1981, withdrew its support from the government and subsequently has started playing a more central political role in Egypt also provides us with a setting in which we can investigate the extent to which rents due to corruption and favoritism have been reallocated from NDP-connected firms to military-connected firms, and whether this was anticipated.

We begin our analysis with a series of event studies, which both illustrate the major political events of the Egyptian Arab Spring and document the value of political connec-

[1] This role of street protests may in part depend on the expectation that there will be future changes in economic or political institutions.

tions in Egypt. We find that following Mubarak's fall, the value of firms connected to the NDP fell significantly, indicating a perception of major shifts of rents away from these firms in the Egyptian Stock Exchange. Since NDP-connected firms were often viewed to gain significant advantage from state-sanctioned monopolies, this result is quite plausible. We also show that these results are not some mechanical consequence of the differential impact of the aggregate events and uncertainty during this time period on some types of firms over-represented among those connected to the NDP. Consistent with some degree of anticipation of subsequent political changes in Egypt (and consistent with the third channel above), we also find an increase in the value of military-connected firms. Since Mubarak's fall was partly engineered by the military's withdrawal of support, it is plausible for market participants to have expected an increased political and economic role by the military in the subsequent months—an expectation that events since then have clearly borne out.

We also document the upheaval in Egyptian politics following Mubarak's fall, and show that the key events that impacted the power of the military and the Islamists during this period are reflected in the stock market returns of firms connected to these groups. In many of these events, there is no change in political institutions or even a change in government, so our interpretation is that these stock market responses reflect a combination of the second and third channels. In the majority of these events, particularly in those driven by large-scale protests, we find that the impact is concentrated on firms connected to the current incumbent group (meaning whichever of the NDP, the military, or the Islamists is currently in power), and there are no offsetting increases in the value of the firms connected to rival groups. This provides some evidence that the significant changes in the values of connected firms during this period cannot be explained solely by the third channel—expectations of rents shifting from one group of connected firms to another. Rather, the markets appears to have perceived that the ability of connected firms to siphon off rents in this economy with notoriously weak institutions will be curtailed by street protests.[2]

Our main results focus on the direct effect of street protests on the returns of politically connected firms. Using information from Egyptian and international print and online media, we construct a daily estimate of the number of protesters in Tahrir square and analyze the effect of these protests on the returns of firms connected to the group then in power. Our specifications estimate the differential changes in the stock market values of different types of connected firms as a function of the size of protests. They show a robust and quantitatively large impact of larger protests on the returns of firms connected to the incumbent group, a loss with no offsetting effects on the value of other connected groups. These results bolster our interpretation that, in the context of the Egyptian Arab spring, the second channel above is playing a critical role–that street protests may have acted as a constraint on rent-seeking.

We further use data from the universe of tweets by Egyptian Twitter users during

[2]The important caveat to this interpretation is that we are unable to accurately observe some of the connected firms which are being anticipated to benefit from the decline of the rents of the firms linked to the current incumbent parties.

this period in order to shed light on several interrelated questions. These include, first, whether social media is playing a role in street mobilizations; second, whether discontent voiced over the social media has an effect over and above actual mobilization in the street; and third, whether the nature of the coalition underpinning street protests is playing an important role in the impact of these protests on the outcomes of interests.

We find that street protests are strongly correlated with tweets involving hashtags related to Tahrir square, confirming what the popular press emphasized—the role of social media in the mobilization of street protests. However, we find no effect from these hashtags on stock market returns with or without conditioning on the impact of street protests. This last result suggests, with all of the usual caveats especially related to the differential measurement error of these variables obtained from different sources, that the distribution of rents in Egypt has responded to discontent voiced on social media only when it resulted in street protests.

Finally, we measure the "turnover rate" of the opposition from changes in re-tweeting activity of different types of messages, and provide some evidence that when this turnover rate is high, protests are less effective in reducing the rents (the stock market value) of connected firms. Our interpretation of this result is that a less cohesive opposition is less effective even in the midst of street mobilization, though there might also be other plausible interpretations.

Overall, we interpret our results as providing suggestive evidence that, in the specific context of Egyptian institutions and its Arab Spring experience, the de facto political power generated by street protests has had a major impact on the extent of rent-seeking by politically connected firms (as perceived by stock market participants). Our results also suggest that these stock market reactions cannot be entirely explained by changes in formal political institutions or anticipated reallocation of rents from one group of connected firms to another. Instead, street protests appear to limit the ability of connected firms to benefit from their links to incumbent powers.

Given the very specific circumstances in Egypt during this time period, it is difficult to draw inferences about the more general impact of street protests and de facto mobilization on political economy and economic outcomes in other institutional and historical settings. Nevertheless, we believe that our work indicates a simple approach for studying this question by looking at the impact of street protests on the valuations of firms connected to different power centers in different settings.

Our paper is related to several recent literatures. The first is the literature on political connections, which uses stock market returns as a measure of the (changing) value of potentially connected firms as we do here. The first study we are aware of using this is strategy is Roberts (1990) for the US. The seminal study in economics is Fisman (2001), who exploited rumors about Indonesian President Suharto's health and found that that the value of connections accounted for 23% of firms' value in the Indonesian stock market during the mid-1990s. Johnson and Mitton (2003) found that connections to Malaysian Prime Minister Mahathir accounted for 17% of firms' total stock market value in a crisis, where the event was the fall from power of Anwar Ibrahim, the Minister of Finance. Similar results are found for Pakistan by Khwaja and Mian (2005) and

for Weimar Germany by Voth and Ferguson (2008).[3] Dube et al. (2011) use the same methodology to show how gains from the information about CIA-supported coups were captured by insiders (with stock market returns moving before the event). See also Dinç (2005), Faccio (2006), Faccio et al. (2006), Leuz and Oberholzer-Gee (2006), and Acemoglu et al. (2013) for various other applications of this methodology.

The second literature we are building on studies the effect of protests and social unrest on political change. Acemoglu and Robinson (2000, 2006) emphasize the effect of protests (and the threat of revolution) on changes in political regimes. In particular, they suggest that protests that temporarily shift the de facto distribution of political power in society, may force a change in political institutions so as to alter the distribution of de jure political power. Several empirical and historical papers have found evidence consistent with the idea that democratizations, particularly in 19th-century Western Europe, have been associated with, and perhaps a response to, major uprisings, protests, and revolutionary threats (e.g., Aidt and Jensen (2013), Aidt and Franck (2013)). Some works in this literature have modeled the decision to take part in protests and the implications of these endogenous protests on political equilibria (e.g., Fearon (2011), Kricheli et al. (2011), and Bidner and Francois (2013)). Another branch of the literature (e.g., Collins and Margo (2007), Madestam et al. (2013)) investigates the implications of factors that prevent or facilitate protests on medium-run economic outcomes. To the best of our knowledge, this literature has not investigated the role of street protests on constraining or redistributing rents from favoritism and corruption in the economy.[4]

Another branch of this literature (e.g., Acemoglu and Robinson (2008)) raises the possibility that politically powerful groups will be able to take offsetting actions in order to deal with popular pressures or even institutional constraints on their power, thus re-creating some of the initial advantages and privileges they had via different channels (this also builds on Michael's's Iron Law of Oligarchy, 1966, as discussed in Acemoglu and Robinson (2012)). The fact that we find an increase in the value of military-connected firms during Mubarak's fall provides some support for this view, but taken as a whole, our results also suggest that street protests do more than just reallocating rents between different powerful groups.

A related literature in economics and political science focuses on political instability and its impact on economic outcomes (e.g., Alesina and Perotti (1996),Alesina et al. (1996a), Alesina et al. (1996b), Svensson (1998), Overland et al. (2005), and Haber et al. (2003)). Though our work is also related to this literature, we differ sharply in our interpretation. Rather than viewing all instability as a cause of uncertainty and thus the discouragement to investment and growth, we show that certain types of protests under

[3] An important difference between this literature and our paper is that, rather than focusing on changes in government or collapses of certain regimes, we mostly focus on changes in the balance of power driven by street mobilization, thus enabling us to shed light on whether such protests can restrain rent seeking under otherwise weak institutions.

[4] Though see Chaney (2013), on the effect of drought in Egypt throughout the last several centuries on ruler concessions to religious authorities, which he interprets as being a partial response to the threat of protests and unrest

weak institutions as those in Egypt may serve as a check on rent-seeking activity.

Another literature related to our work concerns the role of social media in political events. Edmond (2013) provides a theoretical analysis of how social media impacts collective action and ruler responses. There is also a large literature in computer science on using social media analysis for determining different political trends and political polarization (e.g., Adamic and Glance (2005), and Weber et al. (2013), in the context of Egypt). Our paper contributes to this literature by showing the impact of social media activity on street protests and also clarifying how this activity might or might not influence the extent and distribution of rents in the economy.

The remainder of this paper is structured as follows. Section 2 describes our dataset and our classification of Egyptian firms into three rent-seeking networks. Section 3 gives historical background and uses a series of event studies to describe the power struggle between these three networks and its impact on the stock market valuation of firms they are connected to. Section 4 presents our main results linking the number of protesters in Tahrir square to the size of economic rents accruing to connected firms. Section 5 investigates the impact of social media on protests, studies whether discontent expressed on social media has an independent effect on differential social returns, and explores the interaction between the cohesiveness of the opposition and street protests. Section 6 concludes.

2 Data

On January 1 2011, 177 firms were listed on the Egyptian stock exchange (this includes all firms trading on the Cairo and Alexandria exchanges for which we also have basic accounting data available). We obtain daily closing prices for each of these firms between January 1, 2005 and July 31, 2013 from Zawya, a financial data provider specializing on the Middle East. The same vendor also provides accounting data and stock return indices. We use these data to construct daily stock returns for each of the firms in our sample, as well as quarterly measures of the size (total assets) and leverage (total debt over total assets) of each firm.

As standard controls we estimate an Egyptian- and a world-market beta for each firm by regressing the daily stock returns of each firm during the 2010 calendar year on the returns on the MSCI-Egypt and MSCI-world indices, respectively,

$$R_{it} = \alpha_i^x + \beta_i^x R_t^x + \nu_{it}, \tag{1}$$

where $x = World, Egypt$ and R_{it} is the return on firm i between its previous trading day and t (note that not all firms trade on each day in our sample). R_t^x denotes the return on the MSCI World and Egypt indices, respectively.

As an additional control variable we also compute a beta measuring the sensitivity of each firm to unrest. We use the Global Data on Events, Location, and Tone (GDELT) dataset to measure the sensitivity of each firm's stock returns to general unrest in the county. GDELT is an open-source project that uses English-language news sources to

compile a list of approximately 250 million political events that occurred across the world from 1979 to the present. For each event the algorithm used by GDELT uses simple grammatical rules to identify an action taken by an actor in a given location upon another actor (in essence, subject, verb, object). We use this dataset to obtain a list of strikes, boycotts, riots, and instances of ethnic clashes between Muslims and Copts (the Christian minority in Egypt) that occurred between January 1, 2005 and Dec 31, 2010. We then regress the stock returns for each firm on a dummy variable that is one on the two trading days following one of the events on our list and refer to the slope coefficient of this regression as "unrest beta", β_i^{Unrest}.[5]

2.1 Connected Firms

Firms listed on the Egyptian stock exchange are required to publish quarterly reports disclosing the names of their board members and principal shareholders. This requirement came into effect during the first quarter of 2011, immediately before the onset of Egypt's Arab Spring.[6] We downloaded these reports from the Egyptian stock exchange's website on a continuous basis.

We classify a firm as connected to the NDP if the name of at least one of the firm's major shareholders or board members appears on a list of 6,000 prominent NDP members posted online by activists in the aftermath of the fall of the Mubarak regime. This list was created as part of a campaign, "Emsek Felool" ("to catch remnants" of the old regime), in order to publicly identify the cronies of the old regime.[7] The list gives the full name, the rank within the NDP, and any official function of each prominent NDP member by Egyptian governorate. The type of functions it lists includes members of parliament, aldermen, and local and party council members.[8] Our algorithm matches 19 names in 24 firms.[9]

In accordance with the Egyptian constitution, the Egyptian military's financial accounts are outside the control of the civilian government (the "two tills" system). This system has historically allowed the Egyptian military to operate autonomously and build a largely opaque empire of non-military economic activities outside of civilian control (Harb, 2003). We classify listed firms as connected to the Egyptian military if they are wholly or partially owned by the military "till". We identify these firms by first selecting

[5] See Appendix B.2 for details on this procedure.

[6] The first reports were filed for the second quarter of 2011, but they contain a section on the status of board members and shareholder structure for the previous quarter, thus also covering the relevant information for the first quarter.

[7] For a description of the "Emsek Felool" internet and street campaign, see articles published by the Guardian, (http://www.theguardian.com/world/2011/nov/16/egypt-national-democratic-party-members), and the Washington Post (http://www.washingtonpost.com/world/middle_east/egyptians-fear-return-of-mubarak-allies/2011/11/16/gIQAS58iTN_story_1.html).

[8] At the time of writing the original list was no longer publicly available at http://www.emsekflol.com/. It is available from the authors upon request. See Appendix A.1 for details on merging the felool list with board members and shareholders.

[9] We end up with 22 NDP firms with non-missing data for estimating our regressions.

all state-owned holding companies, that is, government-owned entities that hold stock in listed firms, from the Zawya database. Although these holdings do not officially declare which of the two "tills" they are accountable to, we distinguish between military- and civilian-government owned holdings simply by checking whether the principal officers, shareholders, or board members of the holding company (or any of its affiliated firms) are linked to the Military (for this we use a variety of sources, see Appendix A.1 for details). Using this procedure we obtain a list of 12 military-connected holding companies that own stakes in listed firms. We then classify a listed firm as connected to the Egyptian military if one of these 12 companies appears on the list of its principal shareholders. This is the case for 33 firms in total. Consistent with a strict division between military and civilian control, we find no overlap between NDP- and military-connected firms.

In addition to NDP- and military-connected firms we also attempted to identify firms connected to the Muslim Brotherhood by collecting the names of prominent members from various sources and cross-referencing them with the names of principal owners and board members of listed firms. Despite committing significant resources to this effort we failed to identify more than one connection. This negative finding may indicate that the Muslim Brothers did not manage to penetrate listed firms in the Mubarak era. However, it may be more likely that those involved may have gone to great lengths to conceal any such connections, for the obvious reason that the Muslim Brotherhood was outlawed and operated underground for most of its existence. As a partial substitute for identifying links to the Muslim Brotherhood we generate a dummy variable for firms that are classified as operating according to Islamic principles by Zawya or MSCI. Both data vendors maintain such classifications to enable Islamic investment. MSCI also uses this classification as the basis for its Islamic stock return indices. For example, MSCI's criteria require that firms adhere to Islamic principles both in the conduct of their business (no investment in firms that cumulatively derive more than 5% of their revenue from alcohol, tobacco, pork, weapons, gambling, etc.) and in their financing (no "excessive" leverage, significant income from interest, etc.).[10] We refer to these firms as "Islamic" because they are likely to benefit relative to their competitors under an Islamist government. For ease of reference, we also sometimes refer to them as "connected" or with some abuse of English, "Islamic-connected". Of the 13 Islamic firms, 8 are connected neither to the NDP nor to the military and the remaining 5 are connected to the NDP.

Panel A of Table 1 shows summary statistics for the three types of connected firms, where we refer to non-connected firms as those that fall into none of the three categories. The table presents means and standard deviations of firm characteristics as of January 1, 2011, before the beginning of Egypt's Arab Spring. The first panel gives statistics for all firms. The second and third panels show the same statistics for connected vs. non-connected, and NDP-, Military-, and Islamic-connected firms, respectively. On average, NDP-connected firms have assets of 2,436m Egyptian pounds and are thus signifi-

[10] See the MSCI website for details on this classification. http://www.msci.com/products/indexes/thematic/faith-based/islamic/ and https://www.zawya.com/cm/analytics/default.cfm?full for the equivalent definition used by Zawya. Appendix Table 1 lists all firms firms that were classified as Islamic by the two sources as of November of 2012.

cantly larger than than the average military-connected firm (with assets of 240m Egyptian pounds). NDP-connected firms also tend to have somewhat higher leverage (computed as total debt divided by total shareholder assets) than military-connected and non-connected firms. Reassuring for our comparisons below is that all types of firms appear to have similar Egyptian-, world-market, and unrest betas.

Table 2 shows the number of NDP-, military-, and Islamic-connected firms in each of the 16 sectors of the economy. Once again reassuringly, all types of firms have representation in a variety of sectors. Fore example, military connected firms cluster in industrial manufacturing but are also active in the food and beverage and the health care sectors. Not surprisingly, Islamic firms are clustered in financial services, but are also active in manufacturing, telecom, and real estate. Throughout our analysis, we include sector fixed effects in our regressions.

2.2 The Number of Protesters in Tahrir square

Our main specifications relate stock returns of firms connected to the incumbent regime to daily variation in the number of protesters in Tahrir square. We construct this series using text analysis of 102 English-language newspapers published between January 2011 and July 2013 in Egypt and around the world. To this end we downloaded all newspaper articles containing the words "protesters"/"protestors" and "Tahrir" and "Egypt" from newspapers in the category "major world publications" of the Lexis Nexis Academic service and from all English-language Egyptian news outlets that are available on the service (Al-Ahram Gate, Al-Ahram Weekly, Al-Akhbar English, and Daily News Egypt). We supplemented this pool of articles with the online content of Al-Masry Al-Youm, Al-Ahram English, and Copts United, such that the Egyptian press covered by our analysis is balanced between pro- and anti-regime news outlets.[11]

We then programmed an algorithm that isolates the number of protesters (usually a term such as "hundreds"or "tens of thousands") reported by each article and identifies the day for which the number is reported (for example, an article published on Tuesday might report on events on the same day, the previous day, or even a day in the previous week). We then assigned a numerical value to each word used. Finally, we set the number of protesters equal to zero for all days on which fewer than three separate outlets report a protest and use the median number of protesters across outlets for all other days. Appendix A.2 gives the details of this algorithm and a sample of our mapping between words and numbers. Using the same algorithm we also constructed a daily time series of the number of protesters in Rabaa square, which became the rallying point for pro-Islamist protesters in the later stages of Egypt's Arab Spring.

Figure 1 plots the resulting estimates for the number of protesters in Tahrir square for each day through the end of July 2013. Panel B of Table 1 presents the summary statistics on the number of protesters for each of the four phases of Egypt's Arab Spring

[11] There is a variation in the political leanings of these newspapers. Some of them are considered to be independent (e.g., Al-Masry Alyoum and Daily News Egypt) others are usually loyal to the state (e.g., Al-Ahram and Al-Akbar).

and for the all four phases combined. "Tahrir Protesters" and "Rabaa Protesters" give the number of protesters in thousands in Tahrir and Rabaa square, respectively. The first phase (Mubarak' fall) has the highest number of Tahrir protesters with an average of 838.07 thousand per trading day. Protests in Rabaa square begin under Islamist rule and reach their peak in the fourth, post-Islamist, phase with an average of 6.44 thousand protesters per trading day. Appendix Figure 1 shows the share of total protesters over the sample period by weekday. It shows that the largest protests tend to be on Fridays (34.87% of total protesters), which is not surprising given that most Egyptians do not work on Fridays. Since protests frequently occur on days on which the Egyptian stock exchange is closed (typically Fridays and Saturdays), we assign the number of protesters turning out on non-trading days to the following trading day in all specifications that relate returns to protests.

2.3 Data from Social Media

In some of our specifications we also relate stock returns and the number of protesters in Tahrir square to activity on social media. In particular, we use data from Twitter to construct a measure of mobilization for street protests, a measure of political support for the political opposition, and a measure of the cohesiveness of the opposition.

To construct these measures, we obtained a list of 318,477 Egyptian twitter users who tweeted at least once between 1 July 2013 and 17 Sept 2013 from an Egyptian social media firm (25trends.me). Using the Twitter Application Programming Interface we downloaded the entire history of tweets made by each of these users. Although Twitter limits the downloadable history of each user to 3,200 tweets, less than 20% of users exceed this limit, enabling a procedure to cover the period back to January 1, 2011 in the majority of cases. We end up with approximately 311 million tweets made by Egyptian users between January 1, 2011 and July 29, 2013.

As a simple measure for the degree of mobilization for street protests we count the tweets that contain hashtags referring to Tahrir square on each day. We refer to this measure as "Tahrir hashtags". As a robustness check we also counted all tweets that contain the words "Tahrir" anywhere in the body of the tweet. This alternative measure delivers almost identical results. To mirror our empirical approach on street protests, we assign tweets made during non-trading days to the following trading day in all specifications that relate Tahrir hashtags to stock returns.

To gauge the political support for the opposition on any given day, we count the re-tweets of tweets made by prominent opposition figures using the following steps. First, we identify the Twitter accounts of all prominent opposition figures that appear on the Socialbakers list of prominent Twitter accounts in Egypt. (Our definition of the political opposition changes as groups move in and out of power. See Appendix A.4 for a detailed list.) Second, we download all daily tweets by these opposition figures. Third, we obtain the number re-tweets of these tweets on any given day. For robustness checks we also count of the number of unique re-tweeters of opposition figures as an alternative measure of political support of the opposition.

Finally, we use our Twitter data to construct a measure of the nature and cohesion of the political opposition on a given day. We calculate the "opposition turnover rate", in analogy to an employee turnover rate, as the number twitter users who re-tweet a tweet of an opposition leader in $t-1$ but not in t divided by the average number of re-tweeters on the two days in percent.[12] This daily turnover in opposition re-tweets captures the ability of opposition leaders to attract and retain re-tweeters. High turnover means low retention of followers.

See Appendix A.3 for details on the construction of our Twitter-based variables. Panel B of Table 1 lists summary statistics.

3 Egypt's Arab Spring and its Impact on Rents

In this section, we provide a brief historical overview of Egyptian politics, emphasizing the role of the three key power groups, the military, the NDP and Islamists. We then describe the events during the Arab Spring while also using the standard event study approach to document the impact of these political changes on the extent of rents—and their changes—in the Egyptian corporate sector (as reflected in stock market valuations of connected firms).

3.1 Historical Background

In 1952 a group of military officers (the "free officers") surrounding Gamal Abdel Nasser deposed the last Egyptian king and descendant of Ottoman viceroys, Farouk.[13] After a brief reign by Mohammed Naguib, Nasser took over the presidency of the newly proclaimed Republic of Egypt in 1954. Nasser's time in office was dominated by the attempt to consolidate independence from colonial powers, repeated conflicts with Israel, and socialist economic policy. During the Suez crisis of 1956, British, French, and Israeli troops invaded the Sinai and parts of mainland Egypt to re-establish Western control of the Suez canal. Although outgunned, the Egyptian government convinced the US and the Soviet governments to impose economic sanctions that resulted in the withdrawal of all foreign forces. This diplomatic victory increased public support for a pan-Arab movement with Nasser at its center that led to a brief political union between Egypt, Syria and parts of Yemen (the "United Arab Republic", 1958-1962). Mounting tensions over water in the Jordan valley and shipping disputes triggered the 1967 war during which Israel occupied the Sinai, Gaza, the West Bank of the Jordan river and the Golan heights.

After Nasser's death in 1970, Anwar Sadat, another member of the "free officers" and Nasser's long-time vice-president, reversed many of the socialist policies of his predecessor

[12] Formally, denoting the set of opposition retweeters in t as T_t we have $\text{Opposition Turnover}_t = \frac{|T_{t-1} \cap T_t^c|}{0.5(|T_{t-1}|+|T_t|)} 100$, where $T_{t-1} \cap T_t^c$ denotes the intersection of T_{t-1} and the complement of T_t.

[13] The general discussion in this section is based on Sayyid-Marsot (1985), Osman (2010), and Amin (2011). For an in-depth discussion of the role of the Muslim Brotherhood and Islamists in Egypt and around the world see Kepel (1985), Riesebrodt (1993), and Kepel (2006). Classic references on Egyptian in economic history are Landes (1958), Issawi (1961), and Owen (1969), and Hershlag (1980).

and embarked on a policy of economic and political liberalization. In 1978 Sadat signed a comprehensive peace deal with Israel that returned the Sinai to Egypt, broke Egyptian ties with the Soviet Union, and permanently aligned Egypt to the West, but also largely alienated it from its Arab allies. As part of the deal, the United States commenced payment of an annual subsidy to the Egyptian military ($1.3bn in 2008).[14]

In 1981 Sadat was assassinated by a radical Islamist. Hosni Mubarak, a former air force officer and Sadat's vice-president, acceded to the presidency, and ruled Egypt under an emergency law that suspended civil rights and granted sweeping powers to the police until his ouster during the Arab Spring. Economically, Mubarak continued his predecessor's policies of economic liberalization with some success. GDP per capita rose about 5-fold during his reign to $2,973 in 2011.[15] However, the general view among Egyptians was that the gains from growth were largely concentrated in the hands of Mubarak's cronies.

The internal balance of power since the formation of the Egyptian Republic in 1954 can be broadly characterized as a struggle between three centers of power: the military, a group of secular elites and cronies of the regime organized in the ruling NDP, and various Islamist movements centering on the Muslim Brotherhood. The prominent role of the military is apparent from the fact that the founding of the republic followed a military take-over and all of its presidents until the Arab Spring had been military men. The constitution written by the "free officers" re-established civilian rule, but also dissolved all traditional political parties, put the military beyond the direct control of the civilian government, and made it a natural seat of power. Also crucial was the "two tills" system, already mentioned above, which allowed the military to build a large economic empire in civilian industries but beyond the civilian government's tax authority. These non-miliatry activities finance a large network of patronage that supplies current and former military officers with everything from subsidised bungalows on the Mediterranean to lucrative posts in the management of military-owned firms upon retirement. Going back to its founding as a modern army under the Ottoman viceroy Muhammad Ali, the Egyptian military has been secular and has periodically purged Islamists from its ranks.

Since 1954 Egypt has for all practical purposes been under one-party rule. After disbanding traditional political parties, Nasser founded the Liberation Rally as the civilian arm of the regime and sole political party. When Nasser aligned Egypt with the Soviet Union, the party was renamed as the Arab Socialist Union, and later Sadat re-organized it into the, ostensibly centrist, National Democratic Party. Consistent with its frequent re-dedications, the NDP never had a clear ideology aside from being modernist and anti-Islamist. Instead, it collected members of the secular elite, bureaucrats, and cronies of the regime. Although founded by the free officers, the NDP quickly grew into an independent center of power, possibly because the successive presidents nurtured it as a counterweight to the military. Particularly in the final years of Mubarak's rule the NDP expanded its influence and prominent NDP members acquiring vast fortunes. Hosni Mubarak's son and would-be successor, Gamal Mubarak, had his power base in the NDP and would have been the first president without a military background.

[14] Congressional budget justification for foreign operations, fiscal year 2008.

[15] Current US dollars, World Bank.

Egypt's Islamist movement has been the main political force opposing the ruling coalition of military and NDP. Its main social organization is the Muslim Brotherhood founded by Hassan al-Banna in 1928. Its ideology is fundamentalist in the sense that it favors a literal interpretation of scriptures and advocates a return to an idealized Islamic society. Its traditional following are the urbanized middle and lower classes. The Muslim Brotherhood and the majority of its offshoots have been outlawed almost continuously since 1948 after it was accused to have instigated riots in Cairo. (In response, its supporters assassinated the prime minister Mahmoud Al-Nokrashi.) Although the Muslim Brotherhood actively supported the free officers in their coup, Nasser cracked down on the movement almost immediately after taking power. Sadat later eased the oppression of Islamists, in part using their support in his anti-socialist agenda. However, the Camp David accords made him extremely unpopular with the Islamist movement (and likely prompted his assassination). Although outlawed, the Muslim Brotherhood continued operating and building a vast network of charitable organizations and religious schools. In the later years of Mubarak's reign it gained a semi-official status and most of its leaders were released from prison. In the 2005 election candidates more or less directly affiliated with the Islamist movement gained around 20% of seats in the Egyptian parliament.

The interplay of these three centers of power was disrupted in 2011, when a broad coalition of disenfranchised youths, urban middle classes, and poor took to the streets of Cairo. The Arab Spring of 2011 began with the so-called Jasmine Revolution in Tunisia, which was initially ignited by public outrage over the suicide of a street vendor in December of 2010. By early 2011, Tunisian President Bin Ali had stepped down, but far from abating, the revolutionary fervor against the rule of privileged elites in Tunisia was getting stronger and soon spread to Egypt.

On January 25, 2011 thousands (5000 according to our measure) of protesters congregated in Tahrir square for the first public demonstration against the Mubarak regime. In a country in which all public demonstrations were illegal and duly crushed, this was a watershed event. Moreover, the protests had not been organized by Islamists, but were instead broad-based and supported by many young middle-class Egyptians.

Egypt's Arab Spring unfolds in four stages: (1) the fall of Mubarak, (2) the rule of the military, (3) the rule of the Islamist Mohammed Mursi, and (4) the recovery of power by the Military. In the remainder of this section we describe and analyze each of these four phases using event studies in the Egyptian stock market.

3.2 The Arab Spring in Event Studies

We now use the standard event study methodology to describe the impact of key political events during Egypt's Arab Spring on the rents captured by different types of connected firms (or at least the perception of these rents by the participants in the Egyptian stock exchange).

Our empirical strategy is to exploit changes in the cumulative return on each firm's stock between the opening of trade on trading day n and the closing of trade on the end trading day m (where we count all trading days relative to Jan 24, 2011, the day

before the first large protest in Tahrir square). Cumulative returns for firm i are defined as $CR[n,m]_i = \sum_{t=n}^{m} R_{it}$, where R_{it} is the log return of firm i from opening to closing on trading day t. We relate changes in cumulative returns to the type of connection of the firm—NDP, military, Islamic—summarized by the vector N_i (in other words, N_i is a vector of three dummies for NDP-, military- and Islamic-connected firms).

The empirical model we estimate can be written as

$$CR[n,m] = N_i'\gamma + X_i'\nu + \epsilon_i, \tag{2}$$

where X_i is a vector of controls, γ is a vector of coefficients, one attached to each one of the dummies in N_i, and ϵ_i is an error term. Because our sample includes non-connected firms, the interpretation is that the vector of coefficients γ measures how the cumulative stock market returns of a group of connected firms have changed relative to the returns of non-connected firms. This strategy is valid if, absent the political events taking place during this window, there are no systematic differences between the returns of the different types of connected firms and the non-connected firms. In other words, we require the standard identification assumption

$$Cov\left(N_i', \epsilon_{it} \mid X_i\right) = 0.$$

The plausibility of this assumption depends on the controls we include in the vector X_i. In our standard specification, these are, in addition to a constant term, the betas β_i^{World}, β_i^{Egypt}, β_i^{Unrest} (as described above), a full set of (16) sector fixed effects, and controls for size and leverage. Our specification here is a slight deviation from the earlier event study literature in that, instead of constructing abnormal returns relative to an Egyptian Capital Asset Pricing Model, we include various controls, including the Egyptian market beta, on the right-hand side.[16] This choice is motivated by several considerations. First, our specification allows for partial diversification between Egyptian and world markets, an important feature in view of the fact that the Egyptian stock market is only a small part of the world market. Second, by separately including the betas for the world market and the Egyptian markets, as well as the beta for times of unrest, this approach controls for omitted factors in a more flexible manner. Our inclusion of sectoral dummies and controls for size and leverage is motivated by the potential differential impacts of political unrest on firms that are in different sectors or have different characteristics or exposure to various risks.

We interpret the vector γ as the effect of the event in question on market participants' expectation of the net present value of economic rents accruing to the three types of connected firms relative to the value of non-connected firms. This interpretation is subject to a number of caveats. First, any change in the value of non-connected firms will lead

[16] In some of our specifications, we follow the earlier literature and work with cumulative abnormal returns computed as

$$CAR[n,m]_i = \sum_{t=n}^{m} R_{it} - \left(\alpha_i - \beta_i^{Egypt} R_t^{Egypt}\right).$$

to a simultaneous change in all of the components of the vector γ. This underscores that all of our results are about *differential rents* (or their perceptions). However, because we typically do not find that all of the components of the vector γ move in the same direction, we believe that our results are not primarily driven by changes in the value of non-connected firms.

Second, rather than a decline in the rents previously captured by a given group, a negative estimate of a component of γ may instead reflect some systematic expected discrimination against these firms. We do not find this a problematic interpretation, since such systematic discrimination would also be politically motivated, and given the common reading that the extent of monopoly power and rents in the Egyptian economy was (and continues to be) very high, we believe that a negative estimate is much more likely to be driven by the disappearance of significant rents rather than going from a situation of no rents to systematic discrimination.

Third, any macroeconomic changes differentially impacting some sectors or types of firms could manifest as positive or negative estimates of the components of γ. Though we are not able to rule out this possibility, we find the relative stability of our results under different sets of controls and with various estimation strategies comforting in this respect.

Fourth, we may find positive or negative effects even when there is no change in *actual* rents if *perceptions* of rents change. We do not see this as a serious shortcoming either, since we are also interested in how society at large, and stock market participants in particular, have perceived the constraints on rent-seeking over this time period.

Fifth, rents may be accruing to powerful minority shareholders and their ability to capture such rents might vary over time and affect our estimates of γ. Though this is a real concern in a country with weak economic institutions, we do not believe that it invalidates our overall inferences. If in fact there is such a change in the ability of the minority to take advantage of the majority exactly during our event window, this should be interpreted as an impact of the changes in the distribution of political power associated with our event. Moreover, any such effects should lead us to underestimate the size of the effect of the event on overall rents. If, for example, after the fall of Mubarak NDP-connected minority shareholders become weaker and are no longer able to capture rents at the expense of other shareholders, this should *increase* (rather than reduce) the stock market returns of NDP-connected firms relative to non-connected firms, which is not the pattern we observe in the data.

Throughout all standard errors we report are robust against heteroscedasticity. In addition, because there might be other factors correlated across connected firms, we have also experimented with adjusted standard errors that account for potential cross-firm correlation of residual returns (see Greenwood (2005); Becker et al. (2013)).[17]

As an alternative to the empirical model described above, we also report results from a synthetic matching estimator aimed at constructing a more informative control group for

[17] To perform this, we run specification (2) for each trading day in the year prior to Egypt's Arab Spring (2010) and use the residuals from this estimation to calculate the cross-correlation matrix of residuals. We then use this estimated cross-correlation matrix to adjust our standard errors. See Appendix B.1 for details on the construction of our adjusted standard errors.

each connected firm. Following Abadie and Gardeazabal (2003), Abadie et al. (2010), and Acemoglu et al. (2013), we construct the control group separately for each connected firm as a convex combination of the subset of non-connected firms that minimizes the deviation of the pre-event behavior of the connected firm from the control group. Intuitively, in contrast to our OLS regression results, which compare firms that are similar in terms of the covariates, this approach compares firms that are similar in terms of the behavior of their pre-event abnormal returns. Details on the construction of this estimator are in Appendix B.3.

3.3 Stage 1: Mubarak's Fall

We begin by analyzing the effect of the fall of Mubarak on economic rents. After January 25, 2011, the protests against Mubarak's regime quickly gained momentum. On Friday January 28, about 50,000 turned out and large daily demonstrations followed in Tahrir square. The Egyptian stock exchange, located in an adjacent side street, did not re-open the following Sunday and remained closed for a number of weeks due to continuing protests. The protests continued to grow. More than 500,000 protesters filled the square on February 1, 8, and 11. On the evening of February 11, the vice president, Omar Suleiman, publicly announced Mubarak's resignation, and the a hand-over of power to the military leadership.

The following weeks were a period of instability. The police had all but disappeared from the streets, there was looting, violence, and protests continued in Tahrir square. By March 23, a measure of order had been restored and the Egyptian stock exchange resumed regular trading.

Table 3 analyzes the effects of this period using our event study methodology. The event window [0,8] ranges from January 25 until the end of the first week of trading after the re-opening of the exchange on March 30. Column 1 shows our most parsimonious specification, which in addition to the indicators for NDP-, military- and Islamic-connected firms includes sector fixed effects. During the event window there was a large (approximately 20%) fall in the market overall. More importantly, we see a negative and marginally significant effect on NDP connected firms (-0.086, s.e.=0.049) and a positive and again marginally significant effect on military connected firms (0.048, s.e.=0.028). These estimates suggest a sizable decline in the value of NDP-connected firms relative to non-connected firms and a non-trivial increase in the value of military-connected firms at the same time.

Column 2 shows our baseline specification in which we control for firms' world-market, Egyptian-market, and unrest betas, as well as size and leverage. We now find a larger effect on NDP connected firms (-0.131, se.e.=0.049) that is statistically significant at the 5% level. The effect on military connected firms declines in magnitude and is no longer statistically distinguishable from zero. This result implies that the loss of connections to the Mubarak regime reduced the market valuation of NDP-connected firms by 13.1 percentage points over the 65 days (9 trading days) after the first large demonstration. In monetary terms, this loss is equivalent to or $1.2bn or about 5% of the market capitaliza-

tion of all Egyptian firms on January 25, 2011.[18] Appendix Table 2 shows the same results for alternative event windows, with similar results. When we add a quartic polynomial in size and leverage the coefficient of interest is almost unchanged (-0.121, s.e.=0.045, not shown).

The remaining columns of Table 3 document the robustness of our baseline specification in column 2. In column 3, we drop the sector fixed effects and show that the same pattern emerges even without these controls. In column 4 we adjust standard errors for the cross-correlation of error terms estimated in 2010 data, with very similar results and somewhat smaller standard errors, reflecting the fact that the residual correlation between connected firms is negative. In view of this result, in the rest of the paper we focus on the generally larger non-corrected standard errors. In column 5, we weight each firm with the log number of transactions in its stock to account for the different volumes of trade across stocks. In both of these columns the results are very similar to those in our standard specification in column 2.

Column 6 reports the estimates from our synthetic matching procedure. Figure 2 shows this estimate visually. The return on NDP-connected firms is again negative and now more precisely estimated, though smaller, at -0.085. We follow the standard procedure of constructing confidence intervals based on a placebo procedure (using the pre-event window). We also find a larger and highly significant positive effect on military-connected firms.

In columns 7 and 8, we use cumulative abnormal returns as dependent variable. The results are again similar but exhibit more precisely estimated positive effects for military-connected firms, especially in column 8.

Figure 3 shows the results of a falsification exercise where we look at differential returns for NDP-connected firms in the weeks prior to January 25, 2011. It shows that the coefficient on the dummy variable for NDP-connected firms is indistinguishable from zero in all cases. Figure 4 shows the distribution of t-statistics on the NDP-, military-, and Islamic-connected dummies when we run our standard specification on each trading day in the 2010 calendar year. It shows a rate of false positives close to 5% for the coefficients on each of the three dummy variables.

Overall, we interpret these results as showing a fairly sizable negative effect on NDP-connected firms. Subject to the caveats outlined above, we believe the most plausible interpretation is that Mubarak's fall triggered a change in the market's expectations of the rents that these firms would be able to capture in the future. Intriguingly, we also find some evidence of a positive impact on the market's perceptions of rents of military-connected firms. This is plausible given the power vacuum and the role that the military played during these events as discussed above. It suggests that there might be some amount of expected rent reallocation across different power groups during this period. Therefore, the results from this time window are potentially consistent with all three channels we considered in the Introduction—(1) the effect of changes in political institu-

[18] This is a sizable effect compared to other estimates in the literature. For example, Johnson and Mitton (2003) find an effect amounting to 6.3% of market capitalization over 13 months. Voth and Ferguson (2008) find an effect amounting to 0.71% of market capitalization over 60 days.

tions on the rents of connected firms (since there was a fall of a well-established regime); (2) the effect of changes in de facto power on the rents of connected firms (since this all happened in the context of unparalleled protests and mobilization); and (3) potential of reallocation of rents from one set of connected firms to another (given the positive effects on military-connected firms). However, as we will next see, during other key events, though there continues to be a negative impact on the firms connected to groups that lose power, we do not find evidence of this type of rent reallocation (or its expectation), and many of these events did not change the distribution of de jure political power, but only de facto power, indicating the importance of the second channel.

3.4 Later Stages

The first phase of the Egyptian Arab Spring ends on April 16, 2011 when an administrative court dissolves the NDP on charges of corruption and seizes its assets. Panel A of Table 4 shows the differential returns for NDP-, military- and Islamic-connected firms during key events of the second phase under military rule. The first key event is a major military crackdown against protesters beginning on July 31, 2011. During this period the Supreme Council of the Armed Forces dropped its alleged support for the protesters, arrested key activists, and attempted repeatedly to forcibly clear the protesters from Tahrir square who continued to demand elections and democratic reforms. The event ended on Sepember 8, when the square was finally cleared, soldiers demolished the encampments and planted grass on the middle of the square. Following a period of calm, protesters then re-took Tahrir square November 17-20 (the second event) and demonstrations continued thereafter. Under pressure, the military finally allowed elections to take place, with the results of the first round announced on May 28 and the results of the runoff election announced on June 24 (the second and third event, respectively). The first round of presidential elections led to a runoff between the former general Ahmed Shafiq, and the Islamist and Muslim Brother, Mohammed Mursi, who proceeded to narrowly win the runoff election with 51.7% of the vote.

The first two months of Mursi's presidency were dominated by a struggle for influence with the Supreme Council of Armed Forces. This culminated with Mursi's sacking of Mohammed Tantawi (the Commander-in-Chief) and the four highest-ranking generals on 12 August, 2012.[19] On December 23, a new constitution promoting political Islam but also granting expanded powers to the military passed in a referendum in spite of a boycott by the secular opposition. From this point onward Mursi was generally seen to overstep his mandate and became increasingly un-popular. A new broad-based opposition movement *tamarood* ("rebel") first collected millions of signatures against his rule and then mobilized for street protests beginning on June 30, 2013. As millions poured into the streets protesting Mursi's rule in Tahrir square and elsewhere in the country, a smaller

[19]The other most senior officers sacked included Lieutenant General Sami Anan (Chief of Staff of the Armed Forces), Vice Admiral Mohab Mamish (Commander of the Navy), Lieutenant General Abd El Aziz Seif-Eldeen (Commander of the Air Defense Forces), and Air Marshal Reda Mahmoud Hafez (Commander of Air Force).

number of his supporters (up to 50,000 according to our measure) camped out in Rabaa Square. On July 4th the military stepped in and removed Mursi from power (column 3 of Table 4).

The results of this series of event studies in Table 4 document a pattern broadly consistent with our expectations—whenever a group loses power, there is a loss of value for firms connected that group, and whenever a group gains power, there is again a value for firms connected to that group. For example, after the military crackdown, military-connected firms gain 8% in value (coefficient 0.080, s.e. = 0.044), while they loose 2.4% when protesters re-take Tahrir square. We see no abnormal returns right after the first round of the presidential elections, which may not be too surprising given that the voting outcome in this round did not strongly shift power towards any of the groups. After the second round, there is an increase in the value of all three groups, which is somewhat surprising. However, this finding might be consistent with the perception of Egyptians that there was a deal at this stage between the old regime and the Islamists that would favor all three powerful groups and thus all connected firms (this suspicion was reinforced by the fact that results were announced only after a week-long delay). Following Mursi's sacking of the powerful generals, but not after passing of the constitution, there is a positive effect on the Islamic-connected firms. We also find that the passage of Mursi's constitution has a negative effect on the value of NDP-connected firms, a finding consistent with the general belief at that time that this constitution was going to put an end to the role of the NDP in the Egyptian political arena. Finally, after the coup against Mursi, there is a loss of value of Islamic-connected firms. These patterns appear to be quite robust as we show in the Appendix. In summary, these results confirm the importance of shifting political power for the market's expectation of future rents.

We should note that the events with the most consistent results—the military crackdown, the retaking of Tahrir square by the protesters and President Mursi's sacking of key generals—did not change de jure political power, political institutions, or the government in place. Instead, they were associated with changes in the balance of power and the de facto power of organized groups—such as protesters or the leading members of the Muslim Brotherhood.[20] As such, these results are both a preview of our main findings on the role of street protests and mobilization on the perception of future rents, which we present below, and an indication that shifts in de facto power matter greatly in an environment with weak institutions.

It is also noteworthy that, by and large, when these events change the power of a particular group, the firms connected to other groups do not experience significant changes in value. Though there are exceptions to this, particularly in the context of the second round of the presidential election, and the impact on the value of NDP-connected firms of the passage of the Muslim Brotherhood's constitution, this overall pattern suggests that

[20]In particular, the military crackdown was a change in the military's policy of dealing with the protesters, and thus clearly did not involve any changes in political institutions, laws or the form of government. The re-taking of the square was likewise simply a change in the events in the streets. Mursi's sacking of generals was also an entirely constitutional move that involved no changes in the structure of formal power.

our findings cannot be explained by the third channel discussed in the Introduction and the previous subsection—the mere reallocation of rents from one set of connected firms to another.

3.5 Other Reactions and Outcomes for Connected Firms

If the political developments during Egypt's Arab Spring truly changed the ability of different types of firms to exploit their connections and capture rents, then we would also expect to see a greater effort by firms to acquire the more politically valuable types of connections and also changes in their actual profitability as the balance of political power shifts in society.

Though we do not have as detailed data on these outcomes, the available data, presented in Table 5, are consistent with these expectations. In Panel A we see that in the year after the beginning of military rule, there are fewer NDP members who are on the boards of the firms in our sample, and more board members with military titles, indicating attempts by firms to disassociate themselves with the NDP elites and build military connections. During the Islamist rule, there is a slight decrease in the number of military titles. We do not see a greater number of members of Muslim Brotherhood on boards. This is most likely due to our inability to identify these individuals (despite our best efforts we managed to compile a list of only several hundred names of publicly-known Muslim Brothers, in contrast to the NDP where we have a list of 6,000 members).

In Panel B we see that the significantly higher profitability of NDP-connected firms drops sharply during the period of military rule, and the profitability of military-connected firms increases. During Islamist rule, we see no change in the profitability of NDP-connected firms, but a sharp drop in the profitability of military-connected firms and a higher profitability for Islamic firms. Though these results, which are looking over longer periods of time, could reflect other concurrent changes during these time windows, they are broadly consistent with the picture that emerges from our event studies and bolster our confidence in the rest of our results.

Overall, we take these results as the first piece of evidence that changes in de facto power impact the ability (or the perception of the ability) of firms connected to powerful groups to capture future rents.

4 Street Protests and Economic Rents

In this section, we present our main results which focus on the impact of street protests on (perceived) rents accruing to connected firms. Our findings in the previous section already suggest that shifts in de facto power, partly related to protest activity, have a major impact on stock market participants' perception of the size of rents that will be captured by connected firms (and which connected firms receive them). We now exploit daily variation in protests and stock returns to show that protests have a systematic effect

on the rents of firms connected to the incumbent regime but not on the rents of other connected firms.

Our main specification takes the form

$$R_{it} = \delta_t + N_i'\gamma + (P_t \times N_i')\,\gamma^p + (\delta_t \times X_i'\nu) + \phi_s + \epsilon_{it}, \tag{3}$$

where R_{it} is as defined above (the log return of firm i from opening to closing of trading day t), P_t denotes the (standardized) number of protesters in Tahrir square on trading day t. In particular, in our baseline regressions P_t is measured as the total number of protesters on that day capped at 500,000, divided by 500,000, so that the maximum value that P_t takes is 1. We cap this variable at 500,000 to reduce the impact of very large protests on a few days (we also deal with this issue by using other functional forms as discussed below). N_i and X_i are again the vector of dummies denoting affiliation to one of the three groups, and our set of standard controls, respectively, and δ_t and ϕ_s denote full set of time and sector fixed effects. Note that this specification allows all covariates other than the sector fixed effects to have fully flexible time-varying effects.

The coefficients of interest are the entries of the vector γ^p. Under the usual assumption that there are no omitted variables conditional on our controls causing differential returns,

$$Cov\left(P_t \times N_i', \epsilon_{it} \mid X_i, \delta_t, \phi_s\right) = 0$$

these coefficients measure the effect of the number of protesters in Tahrir Square on the stock market valuation of connected firms. Specifically, we require that (1) there should be no omitted variables that fluctuate at the daily frequency and are correlated with both stock returns and the number of protesters in Tahrir square, and (2) that there is no reverse causality from daily stock market returns to the intensity of protests.

A specific concern would be that news about the current government's popularity or performance might impact stock returns of different types of firms while also triggering protests. Though this concern is potentially important, we believe that our use of daily data greatly alleviates it. In particular, there is a considerable degree of randomness in which days protesters are able to solve the collective action problem, organize and mobilize, and this variation will be quite important in our results.[21] Relatedly, we will demonstrate that future protests have no predictive power for current stock market valuations, weighing against concerns about omitted factors and reverse causality.[22]

Columns 1-4 in Table 6 show estimates of equation (3) for each of the four phases of the Egyptian revolution. Column 1 shows a negative and statistically significant effect

[21] If protests were anticipated in advance, this would also imply that future protests should impact current stock market prices, a pattern we do not find any support for as we explain next.

[22] A related concern is that protests are often led by a small group of "leaders" and one might worry whether these leaders have any information about the vulnerability of the incumbent group. We do not see this as a threat to our empirical strategy either. First, the fact that there are leaders in the protests does not change the fact that the protests are shifting the balance of power in society (and our results are a testament to that). Second, if the superior information of the leaders about regime vulnerability were an important factor, we would again expect our specification tests to show the correlation between current stock market returns and future protests, which is not the pattern we see in the data.

of street protests on the stock market valuation of NDP-connected firms during the first phase of the revolution. Given that $P_t = 1$ corresponds to 500,000 (or more) protesters turning up to Tahrir square, the coefficient (-0.016, s.e.=0.006) shows that when there are 500,000 protesters in Tahrir square, there is an associated 1.6% decrease in the valuation of NDP connected firms. The cumulative number of protesters during this first phase according to our standardized measure is 1.22, such that the cumulative impact of street protests on the value of NDP connected firms is a 1.95% decrease. We find no statistically significant impact on firms connected to other groups.

Column 2 shows the same specification for the second phase, under military rule. Now we see a substantial impact on military-connected firms (-0.009, s.e.= 0.003), and no significant effect on NDP-connected and Islamic firms. The cumulative impact of street protests on the value of military-connected firms is a decrease of 4.8% during this phase.

Column 3 looks at the third phase (Islamist Rule), and finds that none of the three effects of street protests are statistically distinguishable from zero, except for a marginally significant, positive effect on NDP-connected firms (0.007, s.e.=0.004). A possible reason for this lack of results in the third phase is that during this period Tahrir square saw both pro- and anti-Islamist protests.

Column 4 looks at the the fourth (post-Islamist) phase, where pro- and anti-Islamist camps separated geographically, and we see that the clear relationship between the number of protesters and the stock market valuation of firms connected with the target group of the protests reemerge. In particular, in this column, we include protests in Rabaa Square, which became the location of pro-Islamist demonstrations, while those in Tahrir square were generally anti-Islamist. Consistent with this, Tahrir square protests have a negative effect, while Rabaa Square protests have a positive effect on Islamic-connected firms (-0.013, s.e. = 0.008, 0.279, s.e.=0.129, respectively).

A notable pattern in Table 6 is that, with the exception of the third phase of the revolution (Islamist Rule), and consistent with our event study results, we find a significantly negative effect of protests in Tahrir square on the stock market valuation of firms connected to the incumbent regime. Motivated by this, in Table 7 we adopt a more parsimonious specification where we pool data from all four phases and include only two dummies, one for being connected to the group that is the current incumbent, and the other one for being connected to one of the other two (non-incumbent) groups. Non-connected firms are again in the regression, so all coefficients are relative to the changes in the values of non-connected firms. Throughout, we also control for the interaction of Rabaa protesters with the dummies for incumbent and connected firms.

Column 1 of Table 7 shows a negative and statistically significant effect of the number of protesters in Tahrir square on the relative market valuation of firms connected to the incumbent government (-0.0060, s.e.=0.0023), and no effect on firms that are connected to the other two groups. Consistent with our previous results, this specification suggests that while street protests significantly decrease the market valuation of incumbent firms, the other connected but non-incumbent groups do not appear to benefit from this fact.

The rest of this table probes the robustness of this result. Column 2 drops all dates identified in our event analysis as involving changes in government or formal institutions

plus the next three trading days (in particular, we drop the fall of Mubarak, the first and the second round of the presidential elections, the passing of the Muslim Brotherhood's Constitution, and the military coup against Mursi). In column 3, we go one step further and drop all of the events studied in the previous section plus the following three trading days. This specification is meant to illustrate that our results here are not just capturing the stock market responses of connected firms in the context of the event studies already reported. The results in columns 2 and 3 are very similar to the baseline, bolstering our interpretation that these findings do not just reflect the protests surrounding the key events.

The rest of the table investigates whether it is current protests or leads or lags of protests that impact the stock market valuation of connected firms. Given the fact that protests often peak after trading hours and the limited liquidity in the Egyptian Stock Exchange, the impact of shifts in the balance of political power might plausibly be transmitted to stock market valuations over several days, and thus there are no a priori reason to expect lags of protests not to be statistically significant. But if leads are statistically significant, this would signal a failure of our identification assumption—in particular, it would make it likely that both protests and stock market valuations are responding to some other slow-moving change that is not being controlled for in our regressions.

The results in columns 4 and 5 show that the impact of current protests is robust, and there is no evidence of leads of protests predicting stock market reactions (i.e., no evidence that *current* stock market outcomes are being predicted by *future* protests). This pattern bolsters our confidence in the results, and weighs against an interpretation in which protests and stock market valuations of different types of firms are being driven by omitted factors or news about other events weakening the regime in power.

The results in columns 6-9 indicate that the effect of protests at the first lag is indeed statistically significant (-0.0148, s.e.=0.0032 in column 7), but they have no effects on stock returns at longer lags.

Appendix Table 9 further investigates the robustness of our results to functional forms, using the (non-capped) level of protesters, the log of protesters, and a fixed effect for protests exceeding 100,000 participants. All results are similar to those presented in Table 7.

We draw three main conclusions from the results presented in this section. First, consistent with our event study results, street protests, and the shifts in de facto power engendered by them, appear to affect the stock market valuation of firms connected to the three rent-seeking coalitions relative to non-connected firms. Second, the *intent* of protesters appears to have real effects: In the first and second phases of the revolution, protests in Tahrir square directed against the incumbent government (first Mubarak's and then military's) tend to reduce the stock market value of firms connected to the incumbent government. In the fourth phase, anti-Islamist protesters in Tahrir square reduce the market valuation of Islamic firms, while pro-Islamist protesters in Rabaa Square appear to increase it. This pattern is confirmed by the results in Table 7, which looks at the effects of protests in the entire sample on firms connected to the incumbent group and their effect on firms connected to the two other groups separately, and shows that the

impact is on firms connected to incumbent. Third, these results bolster our conclusion from the previous section that the patterns we are reporting cannot be interpreted as the outcome of protests merely reallocating a given amount of rents across different sets of connected firms (the third channel discussed in the Introduction). Instead, it appears that it is de facto power emanating from street protests that is curtailing the total amount of rents accruing to connected firms.

5 Social Media and Protests

Much has been written on the role of social media in triggering and coordinating protest activity during the Arab Spring. Nevertheless, there has been little systematic analysis of the impact of social media on protest activity and on the broader political equilibrium in the Arab Spring (or in any other context that we are aware of).[23] In this section, we use our detailed Twitter data to study a number of related questions. First, we investigate whether social media activity predicts protests. Second, we analyze whether discontent voiced on social media impacts stock market returns with or without simultaneously controlling for street protests (which we showed in the previous section to be an important determinant of these returns). Third, we use social media data to glean additional information about the nature of the protests and show that the cohesiveness of the opposition as reflected in the pattern of re-tweeting interacted crucially with the impact of protest activity on differential returns of connected firms.

Panel A of Table 8 shows that there is a positive association between Tahrir hashtags, our main measure of social media activity related to the protests, and the number of protesters in Tahrir Square during the four phases of Egypt's Arab Spring. To facilitate the interpretation of the coefficients we standardize both the left and the right hand side variables throughout the table by deducting their respective mean and dividing by their respective standard deviation in the full sample. During the first phase of the revolution (Mubarak's fall) the authorities blocked access Twitter between January 25 and Feb 2, 2011 (one some days they also shut down the entire internet and some phone services). Although it was still possible to tweet by telephone during this period, we control for limited access to social media and the internet by adding a fixed effect for this period on the right hand side. Interestingly, the coefficient on this fixed effect is positive and marginally statistically significant, suggesting that invasive measures that cut access to social media may have back-fired in this instance.

In all phases, except in the post-Islamist one, where many protests were by Muslim Brotherhood supporters who were unlikely to use the Tahrir hashtags, we see strong correlation between this measure of social media activity (related to protests) and the protests themselves. Column 5 pools all phases together and confirms the pattern. The point estimate (0.219, s.e.=0.075) suggests that a one standard deviation increase in the

[23] As mentioned in the introduction, Weber et al. (2013) use Twitter data to map out the segregation between different camps in the Egyptian Arab Spring, but did not investigate any of the questions we explore in this paper, and specifically in this section.

number of tweets is associated with a 0.219 standard deviation increase in the number of protesters in Tahrir square.

The results in columns 1-5 could simply be reflecting the fact that protesters turn up to Tahrir square and then report their presence on Twitter using the Tahrir hashtag. Columns 6 and 7 investigate this issue by studying whether it is the leads or lags of hashtags that are correlated with protests. Reassuringly, we find that it is the lags of Tahrir hashtags that matter for protests more than the current or the lead values. If it were simply that people who are participating in protests are also tweeting about it, then we would expect a contemporaneous correlation between the two variables. The lead being the dominant variable, on the other hand, would suggest that both of these variables might be reflecting some other news or omitted factors. Instead, the lagged hashtags being the dominant variable, the pattern we find in the data, is consistent with the view that social media is being used as a vehicle for mobilizing people—who then turn out to Tahrir square the following day.

In Panel B, we look at the amount of re-tweeting of tweets by opposition leaders, which we interpret as a measure of general discontent with the government in power and support for the opposition. We find very similar results, suggesting that general discontent is also associated with greater numbers of protesters in Tahrir square. When we turn to the timing, however, the evidence is less clear-cut about whether it is current values or lags or leads of this measure that matter. Because of the serial correlation in this variable, when any two of these are included together, neither is individually statistically significant (though they jointly are).

When we include both the Tahrir hashtags and the re-tweeting variables together, we find that the coefficient on Tahrir hashtags remains statistically significant at the 1% level (0.140, s.e.=0.050) while the coefficient on re-tweets of opposition is now only marginally significant (0.202, s.e.=0.107). This pattern is plausible since Tahrir hashtags are more directly related to the protests than the more general discontent captured by our opposition re-tweets variable.

Interestingly, however, columns 1-4 of Table 9 show that social media activity has no impact on differential stock market returns with or without controlling for actual street protests. Though this might reflect the differential measurement error in our various different measures (e.g., perhaps our social media variables are measured with greater error), it is also consistent with the view that what matters for the actual balance of power—and the resulting economic rents—is the mobilization of people in the street not their general discontent. This is, in particular, consistent with the fact that discontent with Mubarak's regime has been deep-rooted in Egyptian society for decades, but had no impact on actual politics until it poured into the streets.

In column 5 we drop our control for the number of protesters in Rabaa Square and instead use our Twitter data to construct a measure of the nature and cohesion of the opposition. In particular, we construct a measure we call "opposition turnover," which is computed from the re-tweeting activity of messages from opposition leaders. In particular, it is defined (in analogy to an employee turnover rate) as the number of Twitter users who re-tweet a tweet of an opposition leader in $t-1$ but not in t divided by the average number

of re-tweeters on the two days. At one extreme, when the composition of re-tweeters changes from day to day, this will indicate a much less cohesive opposition (with fewer dedicated members), relative to the other extreme where the same people re-tweet more systematically. It might then be reasonable to imagine that a less cohesive opposition will not be able to exert as much de facto power as a more cohesive opposition. Our results in this table confirm this expectation. Though the opposition turnover variable does not have much of an effect by itself, when this turnover variable is high, protests have a more limited impact on the rents captured by firms connected to incumbent.[24] The interaction between the incumbent dummy, Tahrir square protests, and the opposition turnover variable is positive and significant (0.0006, s.e.=0.0003). The estimate implies that a one standard deviation increase in the opposition turnover rate (3.73) is associated with a 13% drop in the effect of street protests on stock returns.

6 Conclusion

The Arab Spring was a momentous set of changes, involving an unparalleled mobilization of people in many parts of the Arab world. In Egypt, it led to the downfall of the regime of Hosni Mubarak who had ruled the country as a de facto dictator for thirty years. The broad-based mobilization unleashed by these events continued after Mubarak's fall, underscoring the importance (but in many instances also the limitations) of the power of the street. Several theories in social science emphasize the role of de facto power, often resulting from groups being able to solve their collective action problems and mobilizing in the street, in changing economic allocations and even in the de jure distribution of political power. Nevertheless, there is only limited evidence in economics or other social sciences showing that changes in the de facto political power of different groups and political mobilization directly matter for any economic outcome.

In this paper, we have provided evidence that protests have played an important role in curtailing rents captured by politically connected firms in Egypt (or at the very least the stock market participants' perceptions of these rents). Starting with an application of the standard event study methodology, we document that during the various phases of Egypt's Arab Spring, protests have reduced the stock market valuation of firms connected to the groups against whom they were organized relative to the stock market valuation of non-connected firms. Except during Mubarak's fall, where we see a positive impact on military-connected firms in some specifications, we do not find an effect on the valuation of firms connected to other powerful groups. Many of the events we focus on did not involve any changes in formal political institutions or the identity of the government in

[24] It is reasonable that it should be the triple interaction of the opposition turnover variable with protests and the incumbent and non-incumbent connected dummies that should matter, not the opposition turnover variable interacted with these connected firms dummies. In particular, the interaction between opposition turnover and the connected dummies correspond to the impact of opposition turnover when there are no protesters. But since when there are no protesters, there is no pressure from the street on the incumbent government, the cohesion of the opposition should also not matter, which is the pattern we find.

power. Rather, they seem to reflect the perception that, in the face of the mobilization, the ability of connected firms to exploit their political connections to their benefit—and likely to the detriment of the rest of society—would be limited. Consistent with this interpretation, we also find that listed firms have increased the number of board members who were from the military when the military was powerful, and at the same time shed board members who were associated with Mubarak's party, the NDP; later, when the Muslim Brotherhood was powerful, they decreased the number of board members using military titles. We also find an increase in the profitability of firms connected to the military when the military was in power, and an increase in the profitability of Islamic firms when the Muslim Brotherhood was in power, suggesting that the expectations of stock market participants were not entirely unfounded.

Our main results go beyond the event study methodology and look at the impact on the stock market valuation of connected firms of daily variation in the number of protesters in the main area of protest activity during this time, Tahrir square. Once again, we find lower stock market valuations of firms connected to the incumbent group relative to non-connected firms during days of heightened protest activity, and no impact on the values of firms connected to other powerful groups. We also illustrate that these results are unlikely to be driven by reverse causality or some omitted factors moving stock market returns first and then triggering protest activity. In addition, these results are not driven by periods straddling events in which there were changes in formal political institutions or the fall or formation of new governments.

These last observations lead us to tentatively conclude that the results we document are not due to changes in de jure political power (formal political institutions and regime) and cannot be explained by the perception that rents are being shifted from one set of connected firms to another. Instead, the most plausible interpretation is that the power of the street—in the presence of weak institutions that are incapable of doing so themselves– is restricting the ability of connected firms to capture excess rents from these connections.

Finally, we also documented that, consistent with popular media coverage of Egypt's Arab Spring, social media played some role in the protests. Both tweeting activity related to Tahrir square and re-tweeting of opposition leaders' tweets, which can be interpreted as a measure of general discontent about the government in power, predict protests. Social media data also enable us to measure daily variation in the cohesiveness of the opposition, and we find that this cohesiveness matters for how impactful street protests are.

We view our results as a first attempt to show the systematic importance of mobilization and de facto political power on important economic outcomes, including the ability of connected firms and individuals to capture rents. Several questions of course remain. First, despite the robustness of our findings and the supporting evidence we provide, we make no claim that our results in this paper exploit exogenous variation or estimate the causal effects of quasi-random variation in protest on rents of politically powerful and connected firms. Exploiting other empirical designs, natural experiments or other sources of potentially exogenous variation to estimate various different types of causal effects is an obvious area for future work. Second, our results are largely confined to studying the impact of various events and spikes in protest on stock market valuations. An important

area for future work is to find other, more direct measures of rent seeking and capture by different types of firms. Third, and perhaps most importantly, we make no claim to external validity beyond Egypt. Though we suspect that de facto political power matters greatly in other contexts also, especially under weak institutions, our results have no implications for how this would play out in other countries. One advantage of our methodology, however, is that it can easily be applied to other settings, so we are hopeful that similar investigations could be carried out to provide a more complete picture of how, and what type of, de facto political power may matter for political and economic equilibria. Fourth, some of the theories emphasizing the importance of de facto political power (e.g., Acemoglu and Robinson, 2000, 2006) stress their impact on political transitions. A more systematic analysis of this question is an area for future work.

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Table 1: Summary Statistics

Panel A: Firm Characteristics by Network

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Share			Mean		
	N	Market Cap	Size	Leverage	β^{World}	β^{Egypt}	β^{unrest}
All	177	1.00	800.87	0.39	0.53	0.79	0.0023
s.d.			1986.15	1.05	0.88	0.80	0.0153
Unconnected	114	0.38	465.46	0.37	0.51	0.79	0.0028
s.d.			1431.53	1.24	0.95	0.95	0.0192
Connected	63	0.62	1412.17	0.43	0.57	0.79	0.0015
s.d.			2627.07	0.59	0.77	0.47	0.0042
NDP	22	0.34	2436.62	0.65	0.58	0.61	0.0003
s.d.			3429.74	0.61	1.23	0.50	0.0053
Military	33	0.07	240.11	0.25	0.56	0.88	0.0015
s.d.			340.43	0.44	0.43	0.45	0.0035
Islamic	13	0.25	2481.98	0.49	0.77	0.68	0.0019
s.d.			2780.73	0.67	1.51	0.64	0.0058

Notes: The table presents means and standard deviations of firm characteristics on Jan 1, 2011, before the beginning of Egypt's Arab Spring. The first panel gives statistics for all firms. The second and third panel shows the same statistics for connected vs. unconnected and NDP-connected, Military-connected, and Islamic firms, respectively. Among the 13 Islamic firms, 5 are connected to NDP and the other 8 are connected to neither NDP nor the military. Share Market Cap denotes the share of each group of firms in the total market capitalization of the Egyptian stock market. Size is in millions of Egyptian Pounds. Leverage is total debt over total assets. β^{World} and β^{Egypt} denote firms' beta with respect to the MSCI-world and -Egypt indices, respectively. Both variables are calculated using return data for the 2010 calendar year. β_i^{Unrest} denotes our measure the sensitivity of a firm's return to general unrest in the country. It is calculated by regressing a firm's return on a dummy variable that is one on the two trading days that follow strikes, boycotts, riots, and instances of ethnic clashes between Muslims and Copts (the Christian minority in Egypt) that occurred between Jan 1, 2005 and Dec 31, 2010.

Table 1 Summary Statistics (continued)

Panel B: Summary Statistics by Phase

	(1)	(2)	(3)	(4)	(5)
	Mubarak's Fall	Military Rule	Islamist Rule	Post-Islamist	All Phases
Date Range	01/01/11 -04/17/11	04/18/11 -08/12/12	08/13/12 07/04/13	07/05/13 07/29/13	01/01/11 07/29/13
Trading Days	38.00	323.00	219.00	16.00	596.00
Means per Trading Day					
Tahrir Protesters ('000)	838.07	13.69	23.57	31.88	70.37
Rabaa Protesters ('000)	0.00	0.00	0.46	6.44	0.34
Retweets of Opposition Leaders	1.74	3.31	5.56	12.48	4.28
Tahrir Hashtags	0.64	1.15	0.77	2.31	1.01
Opposition Turnover Rate	5.43	8.00	10.12	18.57	8.90
Daily Mean Return on Portfolio of					
All Connected Firms	-0.60	-0.09	-0.01	0.22	-0.08
NDP	-1.05	-0.09	-0.00	0.08	-0.11
Military	-0.37	-0.09	-0.02	0.30	-0.07
Islamic	-1.01	-0.04	-0.00	0.22	-0.08
Unconnected Firms	-0.47	-0.15	-0.04	0.30	-0.12
All Firms	-0.01	-0.00	-0.00	0.00	-0.00
Incumbent Group	NDP	Military	Islamic	Islamic	N/A

Notes: The table presents the number of trading days and means per trading day of time-series variables used in our analysis. Columns 1-4 show statistics for each of the four phases of Egypt's Arab Spring while column 5 gives statistics for the all four phases combined. Tahrir Protesters ('000) and Rabaa Protesters ('000) give the number of protesters in thousands in Tahrir and Rabaa square, respectively. Retweets or Opposition Leaders refers to the number of retweets received by a list of prominent members of the opposition. Note that this list changes as groups move in and out of power see Appendix A.4 for details. Tahrir Hashtags denotes the number of tweets containing a hashtag containing the word "Tahrir". Opposition Turnover Rate is measured as the number twitter users who re-tweet a tweet of an opposition leader in $t-1$ but not in t divided by the average the average number of re-tweeters on the two days in percent. Throughout we assign tweets made during non-trading days and the number of protesters turning out on non-trading days to the following trading day. Daily Mean Returns denotes the returns in percent on an equally weighted portfolio of all connected firms, NDP-connected firms, military-connected firms, Islamic firms, unconnected firms, and all firms, respectively. Incumbent group denotes the group (NDP, Military, Islamist) that is the target of protests in Tahrir square during each of the four phases of Egypt's Arab Spring.

Table 2: Firm Connections by Sector

	NDP	Military	Islamic	Unconnected	All
Agriculture	0	0	0	8	8
Construction	3	0	0	7	10
Consumer Goods	0	1	0	3	4
Education	0	0	0	2	2
Financial Services	4	0	5	23	31
Food and Beverages	2	8	1	10	20
Health Care	1	4	0	6	11
Industrial Manufacturing	3	10	1	23	37
Leisure and Tourism	1	1	0	7	9
Media	0	1	0	0	1
Mining and Metals	2	2	0	3	7
Oil and Gas	0	2	0	2	4
Real Estate	4	0	4	18	23
Services	0	0	0	1	1
Telecommunications	1	0	2	0	3
Transport	1	4	0	1	6
Total	22	33	13	114	177

Notes: The table shows the number of NDP-connected, military-connected, Islamic, unconnected, and all firms in each of the 16 sectors of the economy. There is no overlap between NDP, Military and Unconnected firms. Among the 13 Islamic firms , 5 are connected to NDP and the other 8 are connected to neither the NDP nor the military. Definition of sectors taken from Zawya.

Table 3: Mubarak's Fall

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CR[0,8]						*CAR[0,8]*	
NDP	-0.086*	-0.131**	-0.142**	-0.131**	-0.142**	-0.085**	-0.145**	-0.109**
	(0.049)	(0.049)	(0.059)	(0.046)	(0.054)	[-0.063,0.058]	(0.056)	[-0.065,0.060]
Military	0.048*	0.032	0.075**	0.032	0.035	0.081**	0.051	0.066**
	(0.028)	(0.030)	(0.021)	(0.026)	(0.033)	[-0.060,0.052]	(0.035)	[-0.056,0.049]
Islamic	-0.031	-0.064	-0.058	-0.064	-0.090	-0.084	-0.125*	-0.094**
	(0.054)	(0.051)	(0.063)	(0.041)	(0.058)	[-0.100,0.128]	(0.066)	[-0.083,0.078]
β^{World}		0.037**	0.023	0.037	0.050**		0.132**	
		(0.016)	(0.023)	(0.023)	(0.013)		(0.046)	
β^{Egypt}		-0.028	-0.021	-0.028	-0.093**			
		(0.018)	(0.025)	(0.023)	(0.030)			
β^{Unrest}		2.134*	0.897	2.134	1.812		11.219**	
		(1.182)	(1.337)	(2.253)	(2.039)		(4.632)	
Size		0.024**	0.022**	0.024**	0.016*		0.014	
		(0.007)	(0.007)	(0.007)	(0.009)		(0.009)	
Leverage		-0.024	-0.003	-0.024*	-0.028		0.017	
		(0.017)	(0.019)	(0.014)	(0.022)		(0.027)	
R^2	0.252	0.320	0.138	0.320	0.387		0.451	
N	145	143	143	143	136		143	
Sector F.E.	yes	yes	no	yes	yes	no	yes	no
Weights	no	no	no	no	yes	no	no	no
Adjusted S.E.	no	no	no	yes	no	no	no	no
Matching E'tor	no	no	no	no	no	yes	no	yes

Notes: Ordinary Least Squares estimates of specification (2) for the event window Jan 25-Mar23, 2011

$$CR[n,m] = \delta + N_i'\gamma + X_i'\nu + \epsilon_i,$$

The dependent variables in columns 1-6 is $CR[n,m]$, the cumulative return on each firm's stock between the opening of trade on the start date n and the closing of trade on the end date m. Columns 7-8 instead use the cumulative abnormal return relative to an Egyptian market CAPM, $CAR[n,m]$ as dependent variable. N_i denotes the vector of dummies indicating firms connected to the NDP, the military, and Islamic firms. The vector of controls, X_i, contains a constant term, each firms world-market beta, β_i^{World}, egyptian-market beta β_i^{Egypt}, unrest beta β_i^{Unrest}, a full set of (16) sector fixed effects and controls for size and leverage. Robust standard errors in parentheses. In column 5 each observation is weighted with log number of transactions on the last trading day of the event window. Standard-errors in column 4 are adjusted for the cross-correlation of firm's returns in pre-event data. Columns 6 and 8 are synthetic matching estimators calculated from comparing the returns on 13 NDP-, 25 military-, and 8 Islamic-connected firms with 65 unconnected firms. 95% confidence interval in square parentheses.

Table 4: Post-Mubarak Events

Panel A: Events during Military Rule

	(1)	(2)	(3)	(4)
	Military	Retake	*Presidential Elections*	
	Crackdown	Tahrir	1st round	2nd round
	CR[91,117]	*CR[163,165]*	*CR[291,292]*	*CR[309,310]*
NDP	0.004	-0.010	-0.015	0.018**
	(0.029)	(0.012)	(0.010)	(0.008)
Military	0.080*	-0.024**	0.002	0.015*
	(0.044)	(0.008)	(0.007)	(0.009)
Islamic	-0.009	0.001	0.010	0.022*
	(0.030)	(0.012)	(0.008)	(0.012)
R^2	0.025	0.250	0.068	0.241
N	138	141	126	137
Sector F.E.	yes	yes	yes	yes
Std. Controls	yes	yes	yes	yes

Notes: Ordinary Least Squares estimates of specification (2) for the event windows July 31-Sep 08, 2011 (column 1), Nov 12-21, 2011 (column 2), May 28-29, 2012 (column 3), Jun 24-25, 2012 (column 4).

$$CR[n,m] = \delta + N_i'\gamma + X_i'\nu + \epsilon_i,$$

The dependent variables in all columns is $CR[n,m]$, the cumulative return on each firm's stock between the opening of trade on the start date n and the closing of trade on the end date m. N_i denotes the vector of dummies indicating firms connected to the NDP, the military, and Islamic firms. The vector of controls, X_i, contains a constant term, each firms world-market beta, β_i^{World}, egyptian-market beta β_i^{Egypt}, unrest beta β_i^{Unrest}, a full set of (16) sector fixed effects and controls for size and leverage. Robust standard errors in parentheses.

Table 4: Post-Mubarak Events (continued)

Panel B: Events during Islamist Rule

	(1)	(2)	(3)
	Generals sacked	Constitution passes	Mursi sacked
	CR[343,344]	*CR[433,433]*	*CR[541,562]*
NDP	-0.002	-0.011**	-0.019
	(0.006)	(0.005)	(0.021)
Military	-0.004	0.003	-0.009
	(0.007)	(0.005)	(0.029)
Islamic	0.010*	-0.005	-0.054**
	(0.006)	(0.005)	(0.016)
R^2	0.069	0.050	0.054
N	122	128	127
Sector F.E.	yes	yes	yes
Std. Controls	yes	yes	yes

Notes: Ordinary Least Squares estimates of specification (2) for the event windows Aug 12-13, 2012 (column 1), Dec 23-23, 2012 (column 2), Jun 4-July 4, 2013 (column 3).

$$CR[n,m] = \delta + N_i'\gamma + X_i'\nu + \epsilon_i,$$

The dependent variables in all columns is $CR[n,m]$, the cumulative return on each firm's stock between the opening of trade on the start date n and the closing of trade on the end date m. N_i denotes the vector of dummies indicating firms connected to the NDP, the military, and Islamic firms. The vector of controls, X_i, contains a constant term, each firms world-market beta, β_i^{World}, egyptian-market beta β_i^{Egypt}, unrest beta β_i^{Unrest}, a full set of (16) sector fixed effects and controls for size and leverage. Robust standard errors in parentheses.

Table 5: External Validity

	(1)	(2)	(3)
Panel A	Number of Board Members		
	Pre-Revolution	Military Rule	Islamist Rule
	Jan 1, 2011	*Jul 1, 2012*	*Oct 1, 2012*
Prominent NDP members	19	14	14
Using military titles	21	28	26
Known Muslim Brothers	1	0	0
Panel B	Profitability of Connected Firms		
	Pre-Revolution	Military Rule	Islamist Rule
	Jul 2009-Jun 2010	*Jul 2011-Jun 2012*	*Jul 2012-Jun 2013*
NDP connected firms	11%	2.7%	2.2%
Military connected firms	8%	11.4%	- 0.01%
Islamic firms	7.9%	2.4%	4.9%

Notes: Panel A shows the total number of board members and major shareholders of firms in our sample that who appear on a list of 6,000 prominent NDP members, that use military titles, or that are known Muslim Brothers (see section 2.1 for details). Panel B shows the profitability of NDP-connected, military-connected, and Islamic firms in the reporting years 2009, 2011, and 2012. Note that the reporting years 2011 and 2012 coincide roughly with our definition of the "Military Rule" and "Islamist Rule" periods as defined in Table 1.

Table 6: The Effect of Street Protests on Stock Market Valuations

	(1)	(2)	(3)	(4)
	Mubarak's Fall	Military Rule	Islamist Rule	Post-Islamist
	Daily Log Returns			
NDP x Tahrir Protesters	-0.016***	-0.001	0.007*	-0.003
	(0.006)	(0.004)	(0.004)	(0.007)
Military x Tahrir Protesters	-0.009	-0.009***	-0.005	-0.001
	(0.006)	(0.003)	(0.003)	(0.006)
Islamic x Tahrir Protesters	0.018	0.006	0.004	-0.013*
	(0.012)	(0.004)	(0.005)	(0.008)
NDP x Rabaa Protesters				-0.081
				(0.116)
Military x Rabaa Protesters				-0.064
				(0.095)
Islamic x Rabaa Protesters				0.279**
				(0.129)
R^2	0.6102	0.3314	0.4209	0.4227
N	5603	43997	27210	1895
Total # Protesters	1.2198	5.2900	4.1748	1.0200
Incumbent	NDP	Military	Islamic	Islamic

Notes: Ordinary Least Squares estimates of specification (3)

$$R_{it} = \delta_t + N_i'\gamma + (P_t \times N_i')\,\gamma^p + (\delta_t \times X_i'\nu) + \delta_s + \epsilon_{it}$$

for each of the four phases of Egypt's Arab Spring. Dependent variable in all columns is R_{it}, the log return on firm i at time t. N_i : vector of dummies reflecting NDP-connected, military-connected, and Islamic firms. P_t : denotes the number of protesters in Tahrir square, capped at and normalized with 500,000. X_i denotes the vector of controls that contains β_i^{World}, β_i^{Egypt}, β_i^{Unrest}, and controls for firm-size, and leverage. δ_s and δ_t are sector and time fixed effects. The specification in column 4 also contains the interaction between N_i and the number of (pro-Islamist) protesters in Rabaa square, again normalized with 500,000. Total # Protesters gives the sum of Tahrir Protesters by phase. Robust standard errors in parentheses.

Table 7: Protests Reduce Stock Market Valuation of Firms Connected to Incumbent Government

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					Daily Log Returns				
Incumbent x Tahrir Protesters	-0.0060**	-0.0062***	-0.0062**		-0.0060***		-0.0057**		-0.0058**
	(0.0023)	(0.0024)	(0.0024)		(0.0023)		(0.0024)		(0.0024)
Connected x Tahrir Protesters	-0.0021	-0.0012	-0.0013		-0.0018		-0.0021		-0.0018
	(0.0021)	(0.0024)	(0.0025)		(0.0021)		(0.0021)		(0.0021)
Lead Incumbent x Tahrir Prot.				0.0006	0.0010				
				(0.0023)	(0.0024)				
Lead Connected x Tahrir Prot.				-0.0017	-0.0014				
				(0.0022)	(0.0023)				
Lag 1 Incumbent x Tahrir Prot.						-0.0108***	-0.0148***	-0.0107***	-0.0146***
						(0.0028)	(0.0032)	(0.0029)	(0.0032)
Lag 1 Connected x Tahrir Prot.						0.0031	0.0043	0.0028	0.0043
						(0.0024)	(0.0033)	(0.0025)	(0.0033)
Lag 2 Incumbent x Tahrir Prot.								-0.0015	-0.0039
								(0.0032)	(0.0032)
Lag 2 Connected x Tahrir Prot.								0.0006	0.0013
								(0.0027)	(0.0028)
Lag 3 Incumbent x Tahrir Prot.								0.0013	0.0005
								(0.0025)	(0.0025)
Lag 3 Connected x Tahrir Prot.								0.0017	0.0018
								(0.0024)	(0.0024)
R^2	0.4040	0.3367	0.3203	0.4039	0.4040	0.4042	0.4044	0.4041	0.4044
N	78705	72527	66857	78705	78705	78705	78705	78705	78705

Notes: Ordinary Least Squares estimates of specification

$$R_{it} = \delta_t + I_i'\gamma + (P_t \times I_i')\,\gamma^p + (\delta_t \times X_i'\nu) + \delta_s + \epsilon_{it}$$

where I_i : denotes vector of two dummies reflecting affiliation to the incumbent rent-seeking network and to the two other non-incumbent rent-seeking networks during each of the four phases of Egypt's Arab Spring, respectively. P_t : denotes the number of protesters in Tahrir square, capped at and normalized with 500,000. X_i denotes the vector of controls that contains β_i^{World}, β_i^{Egypt}, β_i^{Unrest}, and controls for firm-size, and leverage. δ_s and δ_t are sector and time fixed effects. All specifications also control for the interaction between I_i and the number of (pro-Islamist) protesters in Rabaa square, again normalized with 500,000. Robust standard errors in parentheses. Column 2 drops all dates identified in our event analysis as involving changes in government or formal institutions plus the next three trading days (in particular, we drop the fall of Mubarak, the first and the second round of the presidential elections, the passing of the Muslim Brotherhood's Constitution, and the military coup against Mursi). In column 3, we drop all of the events studied in Tables 3-4 plus three trading days after each event in Talbes 4 and 4.

Table 8: Activity on Twitter Predicts Protests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Mubarak's Fall	Military Rule	Islamist Rule	Post-Islamist	All Phases		
Panel A	*Number of Tahrir Protesters*						
Tahrir Hashtags	3.834**	0.089***	0.642**	0.707	0.219***	0.108	0.237*
	(1.922)	(0.025)	(0.261)	(0.738)	(0.075)	(0.115)	(0.133)
Internet Shutdown	2.006*				1.859*	1.871*	1.858*
	(1.090)				(1.069)	(1.070)	(1.070)
Lag Tahrir Hashtags						0.137	
						(0.123)	
Lead Tahrir Hashtags							-0.022
							(0.117)
R^2	0.148	0.046	0.250	0.112	0.078	0.083	0.077
Panel B	*Number of Tahrir Protesters*						
Retweets of Opp.	-1.037	0.047***	0.469***	0.035	0.258**	0.181	0.137
	(1.265)	(0.018)	(0.123)	(0.063)	(0.103)	(0.136)	(0.195)
Internet Shutdown	1.232				1.987*	2.005*	2.016*
	(1.076)				(1.074)	(1.075)	(1.073)
Lag Retweets of Opp.						0.098	
						(0.102)	
Lead Retweets of Opp.							0.155
							(0.151)
R^2	0.021	0.002	0.370	-0.043	0.095	0.098	0.104
Panel C	*Number of Tahrir Protesters*						
Tahrir Hashtags					0.140***	0.080	0.174*
					(0.107)	(0.101)	
Lag Tahrir Hashtags						0.079	
						(0.120)	
Lead Tahrir Hashtags							-0.055
							(0.104)
Retweets of Opp.					0.202*	0.133	0.086
					(0.107)	(0.138)	(0.198)
Lag Retweets of Opp.						0.081	
						(0.107)	
Lead Retweets of Opp.							0.151
							(0.159)
R^2	0.161	0.044	0.383	0.159	0.111	0.116	0.117
N	83	483	326	25	917	917	916

Notes: Ordinary Least Squares estimates with robust standard errors in parentheses. Dependent variable in all columns is the number of protesters in Tahrir square on any given day. Independent variables are the number of tweets with Tahrir hashtags (Panels A and B) and the number of retweets received by opposition leaders (Panels B and C). The dependent variable and these independent variables are normalized by deducting the sample mean and dividing by the sample standard deviation. All specifications contain a constant term (not reported) and a fixed effect for days in which Twitter was blocked in Egypt (Internet Shutdown, not reported in Panel C).

Table 9: Activity on Twitter and Stock Returns

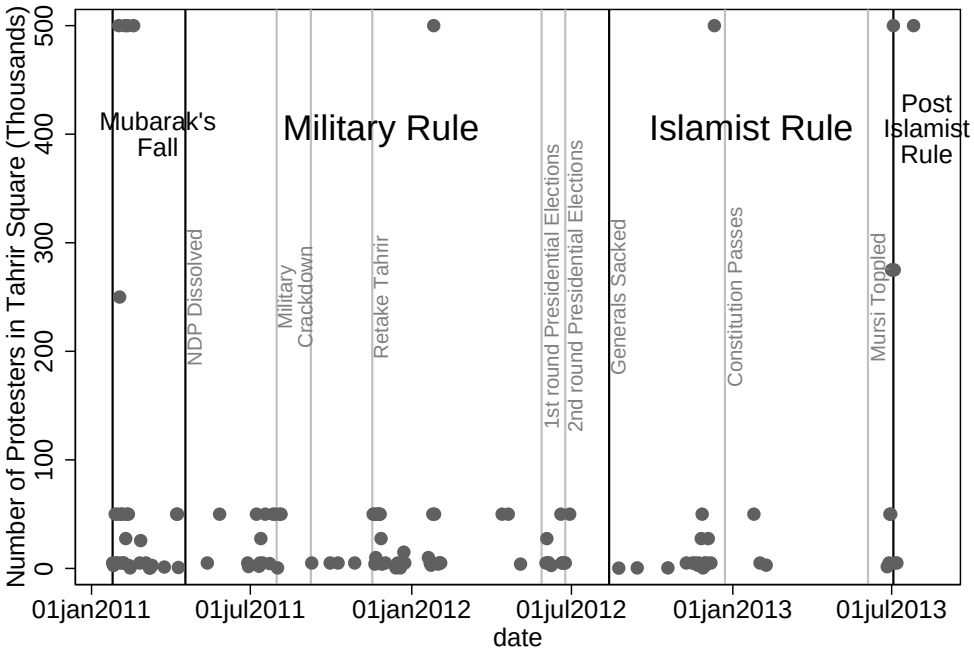
	(1)	(2)	(3)	(4)	(5)
			Daily Log Returns		
Incumbent x Tahrir Protesters		-0.0008***		-0.0007***	-0.0171**
		(0.0002)		(0.0002)	(0.0078)
Connected x Tahrir Protesters		-0.0002		-0.0002	0.0016
		(0.0002)		(0.0002)	(0.0053)
Incumbent x Retweets of Opposition	0.0004	0.0005*			
	(0.0003)	(0.0003)			
Connected x Retweets of Opposition	-0.0002	-0.0001			
	(0.0002)	(0.0002)			
Incumbent x Tahrir Hashtags			0.0000	0.0001	
			(0.0002)	(0.0002)	
Connected x Tahrir Hashtags			-0.0002	-0.0002	
			(0.0002)	(0.0003)	
Incumbent x Opposition Turnover					-0.0001
					(0.0001)
Connected x Opposition Turnover					0.0000
					(0.0001)
Incumbent x Tahrir Prot. x Opp. Turnover					0.0006**
					(0.0003)
Connected x Tahrir Prot. x Opp. Turnover					-0.0001
					(0.0002)
R^2	0.4039	0.4040	0.4039	0.4039	0.4040
N	78705	78705	78705	78705	78705

Notes: Ordinary Least Squares estimates of specification

$$R_{it} = \delta_t + I_i'\gamma + \left(P_t \times I_i'\right)\gamma^p + \left(T_t \times I_i'\right)\gamma^T + \left(\delta_t \times X_i'\nu\right) + \delta_s + \epsilon_{it}$$

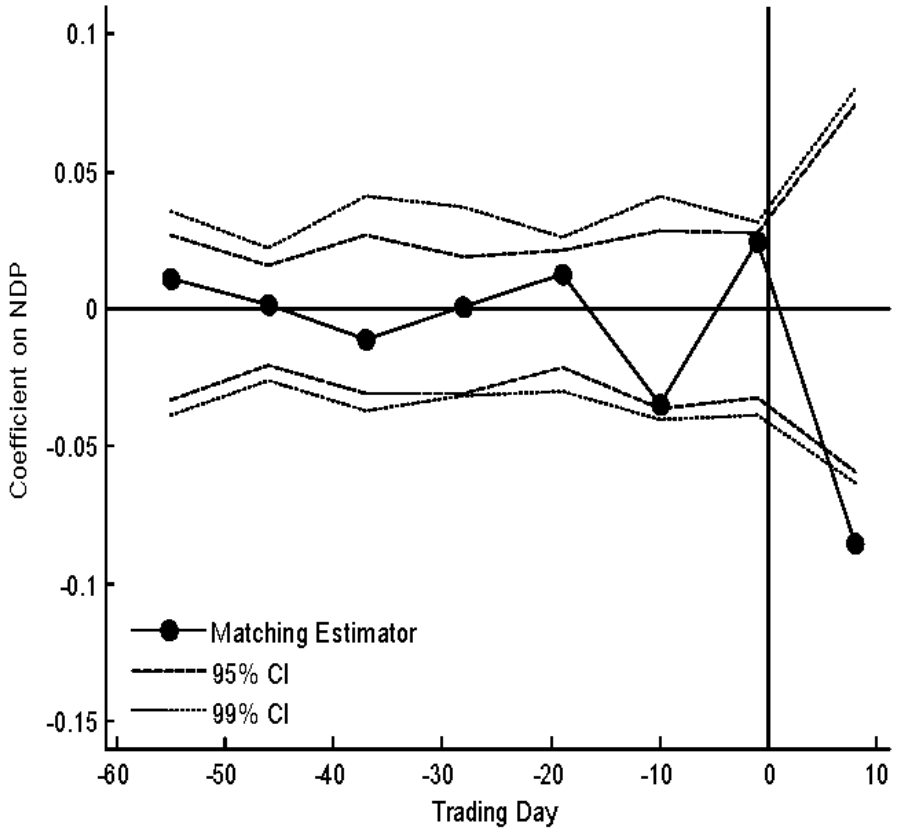
where I_i : denotes vector of two dummies reflecting affiliation to the incumbent rent-seeking network and to the two other non-incumbent rent-seeking networks during each of the four phases of Egypt's Arab Spring, respectively. P_t : denotes the number of protesters in Tahrir square. T_t denotes measures of activity on Twitter (Tahrir Hashtags and Retweets of Opposition). X_i denotes the vector of controls that contains β_i^{World}, β_i^{Egypt}, β_i^{Unrest}, and controls for firm-size, and leverage. δ_s and δ_t are sector and time fixed effects. T_t and P_t are normalized by deducting the sample meand and dividing by the sample variance. Robust standard errors in parentheses. Column 5 adds the triple-interaction $I_t \times P_t \times O_t$ where O_t is the opposition turnover rate measured as the number twitter users who re-tweet a tweet of an opposition leader in $t-1$ but not in t divided by the average the average number of re-tweeters on the two days in percent.

Figure 1: Number of Protesters in Tahrir Square



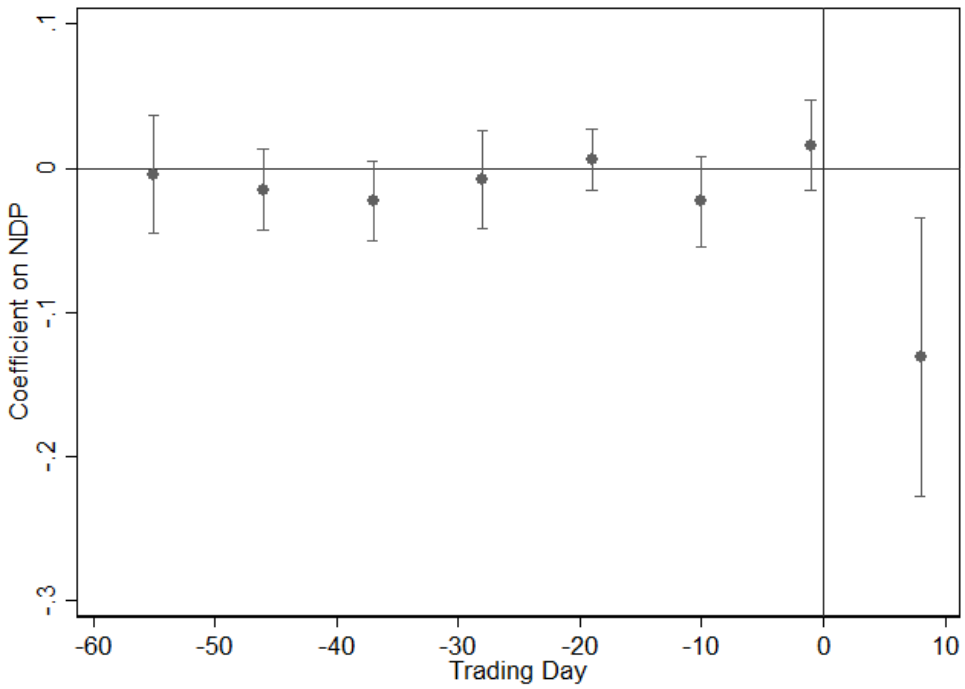
Note: Number of protesters in Tahrir square on each day between Jan 1, 2011 and July 30, 2013.

Figure 2: Placebo Regressions in Pre-Event Windows using Matching Estimator



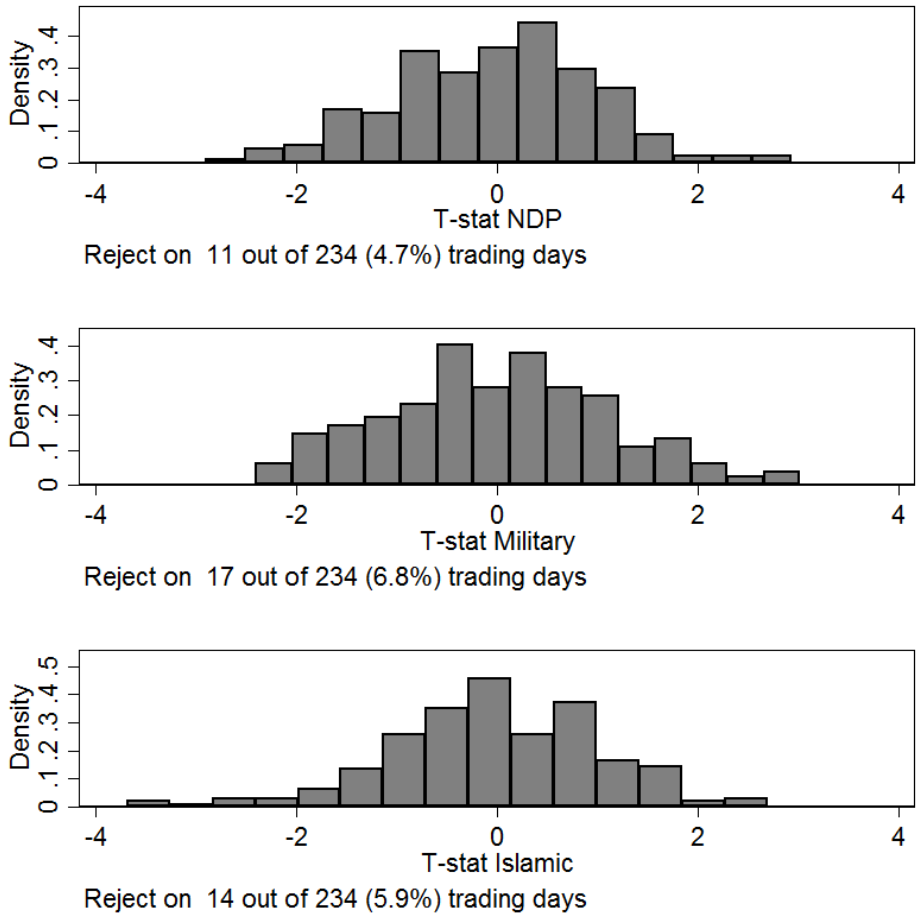
Note: Coefficients, 99%, and 95% confidence intervals on the dummy variable for NDP-connected firms in specifications corresponding to column 6 of Table 3. The figure shows coefficients for seven consecutive event windows prior to Jan 25, 2011 (event trading day 0). Each event window consists of 8 consecutive trading days. For comparison, the coefficient furthest to the right depicts the treatment effect of Mubarak's fall shown in column 2 of Table 3.

Figure 3: Placebo Regressions in Pre-Event Windows,



Note: Coefficients and 95% confidence intervals on the dummy variable for NDP-connected firms in specifications corresponding to column 2 of Table 3. The figure shows coefficients for seven consecutive event windows prior to Jan 25, 2011 (event trading day 0). Each event window consists of 8 consecutive trading days. For comparison, the coefficient furthest to the right depicts the treatment effect of Mubarak's fall shown in column 2 of Table 3.

Figure 4: Placebo Regressions for all Trading Days in 2010



Note: Histograms on T-Statistics on the dummy variables for connected firms in specifications corresponding to column 2 of Table 3. The figure shows histograms of T-statistics obtained from running the standard specification in column 2 of Table 3 for each trading day between Jan 1, 2010 and Nov 30, 2010.