RISKY BUSINESS POLITICAL INSTABILITY AND GREENFIELD FOREIGN DIRECT INVESTMENT IN THE ARAB WORLD

Martijn Burger, Elena Ianchovichina, and Bob Rijkers

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Send correspondence to:
Bob Rijkers
World Bank, USA
brijkers@worldbank.org

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21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Abstract

Which foreign direct investments are most affected by political instability? Analysis of quarterly greenfield investment flows into countries in the Middle East and North Africa from 2003 to 2012 shows that adverse political shocks are associated with significantly reduced investment inflows in the non-resource tradable sectors. By contrast, investments in natural resource sectors and non-tradable activities appear insensitive to such shocks. Consistent with these patterns, the significant reduction in investment inflows in Arab Spring affected economies was starkest in the non-resource manufacturing sector. Political instability is thus associated with increased reliance on non-tradables and aggravated resource dependence. Conversely, how intensified political instability affects aggregate foreign direct investment is critically contingent on the initial sector composition of these flows.

JEL Classifications: F21, F23, P48, O13, O16

Key words: Foreign direct investment, Greenfield FDI, political instability, natural resources, tradables, non-tradables, Dutch disease.

ملخص

ما هي الاستثمارات الأجنبية المباشرة الأكثر تضررا من خلال عدم الاستقرار السياسي؟ يدل تحليل تدفقات الاستثمار التأسيسي الفصلي فى بلدان في الشرق الأوسط وشمال أفريقيا 2003-2012 على أن الصدمات السياسية السلبية ترتبط بانخفاض كبير في تدفقات الاستثمار في القطاعات الغير قابلة لتداول الموارد. وعلى النقيض من ذلك، يبدو أن الاستثمارات في قطاعات الموارد الطبيعية والأنشطة الغير قابلة للتداول تكون حساسة لمثل هذه الصدمات. واتساقا مع هذه الأنماط، كان هناك انخفاض كبير في تدفقات الاستثمار في الاقتصادات المتأثرة بالربيع العربي في قطاع الصناعات التحويلية. وهكذا يرتبط عدم الاستقرار السياسي بزيادة الاعتماد على السلع غير التجارية والاعتماد الزائد على الموارد. على العكس، كيفية تأثير عدم الاستقرار السياسي المكثف على إجمالي الاستثمار الأجنبي المباشر يتوقف بصورة حاسمة على تركيبة القطاع الأولي من هذه التدفقات.

1. Introduction

The recent hostage crisis at the Tigantourine gas facility in Amenas, Algeria, serves as a grim reminder that investing in politically unstable countries is risky. The four-day occupation of the gas complex, jointly owned by the Algerian state oil company Sonatrach, the British firm BP, and the Norwegian firm Statoil, resulted in the deaths of 39 expatriates, including four BP employees. In spite of initial trepidation over involvement in petroleum projects in Algeria in response to this unsettling event, it was only a matter of days before BP's Press Office issued a communique stating that "*BP remains committed to Algeria where it has high-quality assets*" (BP 2013), a statement later reinforced by U.K. ambassador to Algeria Martyn Roper, who went on record asserting that "*BP will stay in Algeria. It is very engaged and will pursue these projects* " (Boston Globe 2013).

While this example contradicts the popular view that political uncertainty hampers investments,[1] BP is certainly not the only multinational that remains engaged in countries in turmoil. Recently, the Emirati Dana Gas and the Italian EniSpA announced major investments in Egypt's oil and natural gas sector, while the Kazakhoil company KazMunaiGaz invested in Libya (FDI Markets 2013). Likewise, empirical studies of the effect of political instability on foreign direct investment have yielded distinctly divergent results. Some have documented a very strong negative relationship between foreign direct investment (FDI) and political turmoil[2](Busse and Hefeker 2007; Daude and Stein 2007; Alfaro et al. 2008). However, others have found no significant effects and concluded that political unrest and institutional quality are not important determinants of investment flows (Noorbakhsh et al. 2001; Blonigen and Piger 2013). In specific instances, certain foreign companies have gained from instability. Incumbent diamond mining companies operating in Angola benefitted from its civil war; they were able to attain higher profits as argued by Guidolin and La Ferrara (2007) on account of lower licensing costs resulting from the reduced bargaining power of the Angolan authorities and laxer enforcement of transparency standards.

One possible explanation for the different results obtained in the literature is that the effect of political instability on FDI varies with the type of investment.[3] Resource-seeking investors may simply not have many alternative investment opportunities due to geographically constrained availability of natural resources (Busse 2004). In addition, they may not have a lot of flexibility in choosing the timing of their investments due to first mover advantages which render timely (early) market entry critical to subsequent success (Frynas et al. 2006). Such first-mover advantages may also be important for market-seeking investors in non-tradables who may not want to forego opportunities in politically unstable countries (Jiménez et al. 2013). An alternative explanation could be that instability creates incentives for rapacious extraction of resources either by reducing governments' time horizon or reducing the stake of future contests, which might result in increased efforts to attract FDI (see Van der Ploeg and Rohner 2012, for a model in which both resource depletion and conflict are endogenous). By contrast, global competition in attracting FDI in the tradable manufacturing and service sectors is arguably more intense since supply is not geographically constrained (Burger et al. 2013) and, hence, FDI inflows into these sectors are more likely to be affected by political instability. Last but not least, differences in sectoral responses to political shocks across sectors might reflect differences in risk-adjusted profit margins, which might be higher in resources and non-

[1]According to the World Bank's most recent Investment Climate Surveys in the MENA region (World Bank 2013), political instability is the most important deterrent to investing.

[2] See Schneider and Frey (1985) for a discussion of the relative importance of political and economic variables in FDI models.

[3] The literature is also inconclusive on which aspects of political instability matter most for foreign investors in different sectors (see e.g. Busse and Hefeker 2007; and Asiedu and Lien 2011). The lack of consensus may reflect econometric issues. Accurately estimating the partial impact of different aspects of political instability is not easy as indicators measuring these different aspects are typically highly correlated, making regression models in which they are simultaneously included difficult to interpret. Addressing this problem by including them separately also presents a problem due to omitted variables bias.

tradables sectors either due to economies of scale, which lower extraction costs, or in oligopolistic industries, where various forms of collusion can increase prices.

To test the explanation that the effect of political instability on FDI varies with the type of investment, we assess the impact of political instability on both the level and composition of cross-border greenfield FDI flows. We define political instability as the propensity of a country to experience regime or government change; political, religious, and ethnic violence, as well as practices that have a detrimental effect on contracts, law and order, and the stability and efficiency of institutions. Shocks to political stability affect economic conditions and thereby affect expected rates of return as well as risk perceptions. We examine whether these affect investments in different sectors differentially. More specifically, we test the hypothesis that negative shocks to political stability have a stronger effect on investments in the non-resource tradable sectors than in the resource and non-tradable sectors. For this purpose, we assemble a quarterly panel dataset of greenfield investments by destination, sector, and source in the Middle East and North Africa (MENA) from 2003 to 2012. The focus on greenfield FDI investments is motivated by the fact that these investments are the dominant mode of entry into MENA countries; these types of flows accounted for more than 80% of all FDI flows into developing MENA during the period of investigation and more than 95% of FDI flows into the developed Gulf economies. In addition, disaggregated data on FDI flows by source, sector, and destination are not available on a quarterly basis.

Whether, and if so how, the drivers of investments vary across sectors has important implications for countries development trajectories and consequently policy design. Many countries strive to attract "high-quality" FDI into (preferably high-tech) manufacturing in the belief that such investments have significant spillovers and will enable them to catch up to the global technology frontier.[4] By contrast, foreign investments in natural resources are often considered a mixed blessing, and even a curse, due to their association with Dutch disease, governance problems, and limited direct job-creating effects.

The MENA region provides a relevant context to test for sector specificity in the relationship between political instability and FDI. The last decade was characterized, if not defined, by high political instability, epitomized by but not limited to the Arab Spring. Political developments in MENA have been volatile, with many events being intense, but short-lived, resulting in high (intra-year) variability in political instability indicators which might have been attenuated by aggregation to annual averages and motivates our use of quarterly data. Moreover, the region is rich in natural resources, which are an important motivation for FDI, and countries in the MENA region are varied in terms of their institutional set-up and resource-dependence, which aids identification.

Our main results can be summarized as follows. We document a strong negative association between adverse shocks to political stability and aggregate greenfield FDI inflows, which is especially large for inflows into non-oil tradable sectors. By contrast, investments in the natural resource sector and investments in non-tradables are not significantly correlated with political instability. Consistent with these patterns, the significant reduction in greenfield investments in countries with Arab Spring uprisings was starkest in the non-oil manufacturing sector. Thus, political instability affects the composition of FDI portfolios, entrenching resource-dependence by harming the growth of non-resource tradables relative to non-tradables. Conversely, the relationship between political instability and aggregate greenfield FDI inflows is critically contingent on the (initial) sectoral composition of these inflows.

These results contribute to several literatures. First, they offer an explanation for the empirical variation in estimates of the effect of political instability on investment. More pragmatically,

[4] For evidence on convergence in manufacturing see Rodrik (2013).

they help predict the likely effect of political developments on investment inflows, and point towards the importance of taking into account the initial sectoral composition of FDI flows when forecasting the impact of political shocks on investment.

Second, they contribute to the literature on governance, resources, and growth, in two ways. First, they suggest that adverse political shocks may limit prospects for diversification into tradables and entrench resource dependence by skewing the composition of investments away from tradables. These effects are reminiscent of re-allocation effects typically associated with Dutch Disease, but a key difference is that we demonstrate that these may arise in the absence of any upward pressure on exchange rates, and instead result from intensified political instability. The Rybczynski theorem offers the mechanism by which such effects might arise as it postulates that at constant relative goods prices, a rise in the endowment of one factor, say capital, will lead to a more than proportional expansion of the output in the sector which uses the factor intensively and an absolute decline of the output of the other good. FDI inflows contribute relatively more toward the capital stock in the resource and non-tradable sectors, thus leading to these sectors' relative output expansions. Further, and more subtle, these effects also hint at a possible mechanism that may help explain the absence of government accountability in many resource-rich countries, which is often ascribed to the government's ability to rely on resource receipts, rather than taxation, to finance public spending (Collier and Hoefler 2009). Our results suggest that citizens and international investors alike do not demand better governance and continue to pursue investment projects in politically unstable countries even when confronted with political turmoil and poor governance.

Third, these results shed light on the debate about the causes of MENA's economic underperformance that predate the Arab Spring, often attributed to poor governance and a failure to upgrade exports and integrate into global production chains (Behar and Freund 2011). Consistent with these explanations, our results suggest that by deterring efficiency-seeking FDI in non-oil manufacturing and tradable services, political instability discourages quality FDI capable of bringing new technology and creating jobs in the region. By hurting efficiency-seeking, quality investments, shocks to political stability exacerbate underinvestment in labor-intensive sectors and aggravate unemployment, which is considered a precursor to political instability in countries with youth bulges.[5]

Last but not least, to our knowledge this paper is among the first to examine the effects of the Arab Spring on FDI and demonstrate that political instability has resulted in a reduction in FDI, especially in non-oil manufacturing activities, in countries with Arab Spring uprisings, including Egypt, Tunisia, Libya, Syria, and Yemen. Continued political uncertainty will likely entrench MENA's dependence on natural resources and limit prospects for economic diversification. On the bright side, the very same resource dependence might have shielded the region from yet more dramatic reductions in FDI; had investments been concentrated in manufacturing and commercial tradables, the decline in investment due to Arab Spring events could conceivably have been more dramatic.

The remainder of this paper is organized as follows. Section 2 discusses the econometric framework and the data, providing a bird's eye view of the sectoral composition and evolution of greenfield FDI and political instability. Section 3 discusses estimation issues and presents our results, while section 4 provides concluding remarks and suggestions for future research.

2. Econometric Framework

Following real options models of FDI (see e.g. Abel et al. 1995; Pennings and Sleuwaegen, 2004), our econometric strategy departs from the assumption that firms consider both expected

[5] Using a time-series, cross-national statistical model for internal armed conflict for the period 1950-2000, and for event data for terrorism and rioting for the years 1984-1995, Urdal (2006) shows that youth bulges increase both opportunities and motives for political violence. The latter may arise as youth bulges are more likely to experience unemployment.

returns and perceived risks when they make decisions about investments abroad, which translates into a greenfield investment function of both expected rates of return and risk (see e.g. Wheeler and Mody 1992; Méon and Sekkat 2012). While standard economic theories predict that investment should increase monotonically with the expected rate of return, the effect of political instability on investment is theoretically ambiguous. Models of investment under irreversibility predict that uncertainty discourages investment by increasing the option value of waiting (McDonald and Siegel 1986; Dixit and Pindyck 1994). However, Abel and Elberly (1999) show that there may be a so-called hangover effect working in the opposite direction if irreversibility prevents the firm from selling capital when its marginal revenue product is low, such that the impact of uncertainty on the long-run capital stock is theoretically indeterminate. As discussed in the introduction, the existing empirical evidence on the relationship between political instability and greenfield FDI is similarly inconclusive, though the majority of studies on MENA point towards a negative association between political instability and investment (see e.g. Chan and Gemayel 2004; Méon and Sekkat 2004; Mina 2012).

To examine whether, and if so how, the sensitivity of investment to political instability varies across sectors, we specify a simple (sector-specific) reduced-form investment model:

$$F_{jist} = \alpha_0 + \alpha_1 F_{jis(t-1)} + \alpha_{js} P_{i(t-1)} + \alpha_3 X_{i(t-1)} + \mu_t + \mu_{jis} + \varepsilon_{it}, \qquad (1)$$

where F is the flow of greenfield FDI in current US dollars from source country j to sector s in country i, P is an indicator of political stability in the host country i, X is a set of variables capturing macroeconomic conditions thought to affect the return to investment, μ_t is a vector of time dummies included to capture global time-related external shocks, such as changes in the global supply of liquidity, commodity price fluctuations, and technological shocks (see e.g. Forbes and Warnock 2012; Burger and Ianchovichina 2013), and μ_{jis} is a vector of country dummies used to control for time-invariant country characteristics. These dummies absorb many important time-invariant determinants of FDI, including factor endowments, country size (Dunning 1993; Markusen 1995) and regulations that do not change over the sample period (Wang et al. 2012). The lagged dependent variable $F_{jis(t-1)}$ is included to allow for adjustment dynamics and to tackle serial correlation. The main parameter of interest is α_{js} which tells us how the relationship between investment and political instability varies by sector and source country.

We allow the sensitivity of FDI to political risk to vary by source-country in addition to sector mainly as a robustness check. Some authors have speculated that investors from countries with strong institutions may be more sensitive to political instability perhaps because they are less apt at coping with it, face greater informational frictions, or are more concerned with corporate social responsibility (see e.g. Cuervo-Cazurra 2006; Driffield et al. 2012).

2.1 Measuring political instability

Political instability is an elusive concept that is both difficult to define and quantify. While some papers define political instability narrowly as regime or government change or the incidence of political upheaval and violence in a society, this paper instead takes a broader approach by using a proxy for political instability that also encompasses policy uncertainty (inter alia pertaining to the enforcement of contracts and property rights). We consider this broader measure of instability appealing given the complexity of political developments in the region over the period considered. Following earlier papers that have examined the relationship between investment and this broader concept of instability (e.g., Busse and Hefeker 2007; Alfaro et al. 2008; Asiedu and Lien 2011; Méon and Sekkat 2012), we use the political risk index from the International Country Risk Guide (ICRG) – a commercial database geared towards providing information to firms that plan to invest abroad – as a proxy for political risk.

This index is a measure of a country's political instability constructed on the basis of experts' subjective assessments of a country's socio-economic conditions, investment profile, internal and external conflict, corruption, the influence of the military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucratic quality in a country. The political instability score ranges from zero to 10, with higher scores indicating more instability. According to the ICRG methodology, a score above 5 indicates a high degree of political instability, while a score below 2 would indicate that the country is characterized by a very low degree of political instability.

While we will use the terms political risk, political uncertainty, and political instability interchangeably, this paper is not concerned with risk or uncertainty in the Knightian sense. The ICRG index is based on prevailing political conditions and since our regressions include country-fixed effects our interpretation of the political risk measure is that it reflects changing political circumstances rather than second-moment shocks/changes in their variance. This interpretation is consistent with evidence presented in Appendix A1 which demonstrates that the ICRG indicator correlates well with objective proxies for political violence, notably violent conflicts and protests, which are unfortunately available only for a few countries in the region.

Figure 1 plots the evolution of political instability and aggregate greenfield FDI over time, separately for countries in Northern Africa, GCC countries, and other Middle Eastern economies. The left panels of Figure 1 show that both the average level and evolution of political instability vary dramatically across countries. Political instability is consistently high in Iraq over the sample period, whereas the GCC countries are among the most stable economies. The onset of the Arab Spring is clearly associated with a surge in political instability, which appears especially pronounced in Northern Africa, and specifically in Libya, Egypt, and Tunisia, as well as Syria in the Middle East. By contrast, in most GCC economies, the political instability index did not increase very much, although Bahrain suffered significant turmoil. This variation in political instability over time and space helps identification.

We also examine the impact of the Arab Spring on investment by defining a dummy variable that takes the value 1 if countries experienced violence and sustained unrest as a result of the Arab Spring and 0, otherwise. More specifically, the Arab Spring dummy is defined at the country-quarter level and takes the value 1 if a country experienced a civil war, revolution or sustained civil disorder during that particular quarter in the period Q4 2010 – Q4 2012. Only Bahrain, Egypt, Libya, Syria, Tunisia, and Yemen experienced such events over the period Q4 2010 – Q4 2012 and countries that experienced only protests are not considered to have been affected by the Arab Spring using this definition.

2.2 Measuring greenfield FDI flows

Data on greenfield FDI by sector, destination, and origin are obtained from the fDi Markets database, a detailed register of cross-border greenfield investments across the world.[6] While we would ideally have examined total FDI flows, comparable data on the value of investments through mergers and acquisitions is not available.[7] Out of necessity our analysis is thus restricted to greenfield FDI flows, which however represent the majority of FDI flows to the region (Burger and Ianchovichina 2013). The database covers both new greenfield investment projects and expansions in 17 MENA countries for the period January 2003 – December 2012.[8] A major advantage of the data is that it enables us to classify investment flows both by sector

[6] The data is recorded on the basis of formal announcements by the media, financial information providers, industry organizations, and market and publication companies and represents 78.6% of global FDI (fDi Markets 2013).

[7] Although the Thompson ONE database includes information on mergers and acquisitions in MENA, data on the value of these investments is typically limited or missing altogether.

[8] West Bank and Gaza and Djibouti are excluded due to data sparseness.

and source country, which allows us to test for heterogeneity in the relationship between political instability and FDI flows.

Overall, the fDi Markets database contains 7,427 investments made in the region by well over 4,500 multinational corporations (MNCs), which we aggregate to the sector-country level shown in Table 1. The table shows the distribution of these investments across MENA countries and broad economic sectors: resources and energy, tradable non-resource manufacturing, tradable services, and non-tradable manufacturing and services based on the classification of Jensen and Kletzer (2005), which is described in Appendix A2. The non-tradables category is a residual group covering inter alia mostly investments in non-tradable services such as utilities, real estate, construction, and the financial services sector. Overall, most capital was invested in resources and energy (30%), followed by non-tradables[9] (28%), and tradable services (26%), with non-resource manufacturing (16%) ranking at the bottom. These broad aggregates, however, mask considerable differences in the sectoral distribution of greenfield FDI across destination countries. In terms of the amount of capital invested, the most investments originated from the Middle East and North Africa (34%), followed by Europe and Central Asia (29%), South and East Asia (19%), and North America (16%).

Greenfield FDI flows also vary over time, as illustrated in the right panels of Figure 1. For visual ease of interpretation, we use annual moving averages, which smooth out volatility in greenfield FDI inflows. Despite the averaging, the FDI inflows depicted in the plots exhibit substantial volatility. Countries in Northern Africa all experienced a surge in greenfield FDI until 2008-2009 when trade and capital flows collapsed in the aftermath of the global economic and financial crisis. Mild recovery of FDI inflows in 2010 appears to have been interrupted by the Arab Spring, which led to further reductions in FDI inflows. Greenfield FDI inflows into GCC countries remained relatively stable over the period, although it is notable that to varying degrees all these countries appear to have been affected by the global financial crisis of 2008. FDI inflows into other Middle Eastern countries are the most erratic over the period. A comparison of the left and right side panels of Figure 1 suggests that countries with the largest increases in political instability also suffered substantial reductions in greenfield FDI inflows.

2.3 Economic variables

When examining the relationship between investment and political instability it is obviously important to account for economic factors. Unfortunately, high frequency data on economic variables for MENA countries are scarce. We draw on two sources to compile quarterly data on inflation, industrial production, and exchange rates. Inflation, measured as the quarterly change in the consumer price index, was derived from national statistical offices, and in some cases the Economist Intelligence Unit database (EIU). The high-frequency database of the Middle East and North Africa Department of the International Monetary Fund (IMF) was the source for the industrial production and nominal exchange rate data. In those cases when no industrial production data are available, we used quarterly export data from the IMF Direction of Trade Statistics database. Descriptive statistics of the variables included in the models are provided in Table A3 in Appendix A3.

3. Estimation and Results

3.1 Estimation issues

One challenge in isolating the effect of political instability on greenfield FDI is that political instability and deteriorating macroeconomic performance often go hand in hand and may in fact aggravate each other. Moreover, there is a possibility of reverse causality, with reductions in greenfield FDI exacerbating political unrest. One solution to this problem would be to instrument political instability, but unfortunately finding credible instruments is hard. Instead,

[9] Non-tradables mainly include investments in the construction, real estate, and financial services.

we recognize this problem and caution that our results should be interpreted as conditional associations, rather than reflecting causal relationships.[10]

A related concern is omitted variable bias, which we try to minimize by including as many relevant economic variables as we could obtain quarterly data for, notably inflation, changes in the nominal exchange rate, industrial production and changes therein.[11],[12] While we would ideally have liked to control for a richer array of macroeconomic factors, high frequency economic data are unfortunately not widely available.

Last but not least, the presence of a lagged endogenous variable creates a potential upward endogeneity bias when estimating equation (1) using Ordinary Least Squares, due to a correlation between the time invariant unobserved fixed effects and explanatory variables. By contrast, fixed effects estimates tend to be biased downwards because of the so-called Nickell bias (Nickell 1981; Kiviet 1995) – a non-negligible correlation between the transformed residuals and the transformed error term. However, Monte Carlo evidence suggests that bias-reduction methods, developed by Bun and Kiviet (2003) and Bruno (2005), work well when T is relatively large and the serial correlation relatively modest as appears to be the case in our data. The raw correlation between greenfield FDI and lagged greenfield FDI is 0.49 and we have on average 36 time series observations per country. These least squares dummy variables bias-corrected estimators are our preferred estimation method for they allow us to control for time-invariant unobservable variables while minimizing the Nickell bias.

As a robustness check, we also present evidence using alternative estimators, including GMM methods. While these have been very popular due to their ability to tackle endogeneity issues by exploiting lags and lagged differences as instruments for contemporaneous levels and changes, we believe they are not ideally suited to tackle the problem at hand. To start with, we do not have the typical small T –large N configuration, but instead a relatively large number of time-series observations leading to potential over fitting and weak instrument bias due to instrument proliferation, whilst simultaneously reducing the Nickell bias. Moreover, the mean stationarity assumption underpinning systems GMM may not be accurate in the present context which is marred by major instability. In addition, from a pragmatic point of view, results are sensitive to the choice of instruments. Nonetheless, we present GMM estimates as robustness checks. We also present estimates using the Han-Philips (2010) estimator, a linear dynamic panel estimator that is especially well-equipped for panels with a moderate time dimension, where variables may develop according to a unit root process.

3.2 Basic results

Table 2 reports the estimates of the regressions using as dependent variable the log of capital invested in greenfield FDI projects in millions of USD.[13] All models are estimated using the Least Squares Dummy Variable bias Corrected (LSDVC) estimation method with bootstrapped standard errors. Six specifications are estimated; we first control separately for political instability (column 1) and economic variables (column 2), and subsequently for both (column 3). A comparison of the results of specification three with specifications one and two enables us to gauge how large the indirect influence of political instability might be due to its effect on macroeconomic management. The fourth specification (column 4) includes only a dummy variable for Arab Spring unrest as an alternative proxy for political instability instead of using

[10]We also do not control explicitly for potential spillovers across countries, although the ICRG political instability index has a component capturing external conflict and the risk of foreign interference and therefore does reflect the impact of unrest in the region on the political stability in the host economy.

[11]In the cases of countries without industrial production data (Bahrain, Lebanon, and Yemen), we use quarterly exports data. Since we are only looking at changes within countries over time this does not yield any major problems.

[12] Ideally, we should have used quarterly Gross Domestic Product (GDP) data, but such series were not available for the majority of countries in the region.

[13] Please note that we transform the logarithm of the dependent variable using an inverse hyperbolic sine transformation (Burbidge et al. 1988) in order to deal with country-quarters in which no investments were made.

the ICRG index; it is intended both as a robustness check and to capture the magnitude of the decline in investment associated with the Arab Spring in countries most affected by it, notably Tunisia, Libya, Egypt, Syria, Yemen, and Bahrain**.** The fifth specification (column 5) includes economic controls in addition to the Arab Spring dummy. The sixth specification (column 6) replicates the fifth specification but also includes the ICRG political instability index; the simultaneous inclusion of the Arab Spring dummy and the political instability measure allows us to assess to what extent the reduction in investment in the Arab Spring was associated with intensified political instability. All specifications include lagged dependent variables as well as country and time dummies. The country fixed effects capture time-invariant, country specific factors, while time dummies control for exogenous factors that changed over the period of interest. This has important implications for the interpretation of the results, and the coefficient on the Arab Spring dummy and political instability measures in particular; these capture the impact of instability net of region-wide shocks.

Starting with the result of focal interest, political instability is strongly negatively correlated with greenfield FDI flows and this effect is consistently statistically significant at conventional 5% significance levels and economically meaningful; a one standard deviation increase in political instability is associated with a reduction in investment flows of roughly three-fifths of their initial value. Moreover, controlling for economic factors, as is done in specification three does not attenuate this relationship and, if anything, marginally strengthens it.

This does not imply that economic factors do not matter. On the contrary, investments are strongly negatively and significantly correlated with inflation (Table 2, column 2). Interestingly, this relationship is slightly weaker when political instability is also controlled for (Table 2, column3), suggesting that political instability and inflation often coincide. In addition, lagged industrial production is also associated with higher levels of greenfield FDI, albeit that this association is only significant at the 10% level. By contrast, changes in industrial production and changes in the exchange rate are not significant predictors of greenfield FDI ceteris paribus.[14] This third specification is our preferred one as it estimates the "direct" effect of political instability on greenfield investment inflows net of its possible impact through economic variables.

Turning to the effects of the Arab Spring, we find a negative and statistically significant association between Arab Spring unrest and greenfield FDI flows, when we do not control for political instability or economic factors (Table 2, column 4). On average, countries experiencing a revolution, civil war, or sustained political disorder associated with the Arab Spring witnessed reductions in greenfield FDI of approximately three-fifths relative to their initial value. In the specification with economic controls, the reduced coefficient estimate on the Arab Spring dummy remains statistically significant (Table 2, column 5). However, once we add political instability to the equation (Table 2, column 6), the Arab Spring dummy loses statistical significance and becomes much smaller. It thus appears that the reduction in FDI flows during the Arab Spring was predominantly driven by intensified political instability.

As a robustness check, Table 3 presents our preferred specification, shown in column 3 of Table 2, re-estimated using alternative estimation methods, notably difference GMM (column 1), systems GMM (column 2), OLS (column 3), LSDV estimates (column 4), and the Han-Philips estimator (column 5).[15] Political instability remains consistently significantly negatively correlated with greenfield FDI regardless of which estimation method we use. Note that the

[14] We also re-estimated the models using real effective exchange rate data from the database constructed by Darvas (2012), which includes real effective exchange rates for 13 MENA countries for at least part of the sample period. Despite a considerable reduction in the sample size, the estimation yielded qualitatively similar results.

[15] As an additional robustness check, not presented in the paper to conserve space, but available upon request, we re-estimated the models separately for each sector using the alternative estimation methods used in Table 3. These alternative methods yielded qualitatively similar results.

LSDVC and LSDV estimates are very similar, suggesting the magnitude of the Nickell bias is relatively limited. The difference and systems GMM estimations result in quite different coefficient estimates, with the latter being very close to the OLS estimates presented in column 4 of Table 3. As discussed in Roodman (2009) this could be indicative of an over fitting or weak instrument problem.

3.3 Sectoral heterogeneity

Table 4 examines the hypothesis that the relationship between political instability varies across sectors by separately estimating our preferred specification for investments into (1) natural resources and energy, (2) non-oil resource manufacturing, (3) tradable services, and (4) non-tradable activities. While we find evidence of a strong negative association between political instability and investments in the tradable non-resource manufacturing and commercial services sectors, political instability is not correlated with investments in resource and energy related activities; the parameter estimate on the political instability is very close to 0 and, moreover, statistically insignificant.[16] This finding is in line with the hypothesis that firms in the resource sector are less deterred by a decrease in political stability, perhaps because of the absence of many alternative location sites and relatively high returns which remain positive even when adjusted for increased risk. The coefficient estimate on political instability for investments in non-tradables is negative, yet statistically insignificant, suggesting that investments in this sector too are relatively insensitive to political instability.[17] If we look at the Arab Spring in particular (Table 5), it appears that this period of political instability in MENA has predominantly reduced greenfield FDI in labor-intensive manufacturing activities in these countries.

Next, we examine whether the heterogeneity in results across sectors we document may in fact be driven by heterogeneity across source countries which we crudely categorize into having high institutional quality and low institutional quality.[18] If, for example, investments in the resource sector are predominantly from countries with strong institutions and investors in such countries are more sensitive to instability, then this might be reflected in a spurious correlation between greenfield FDI into resource sectors and instability. To test this hypothesis we separately examine investment flows to different sectors from countries with strong versus weak institutions. The results, presented in Table 6, however, reject the notion that the responsiveness of investments differs between the two country groupings; differences in coefficient estimates between different country groupings are consistently very small.

Another potential concern is that the results are driven by differences in adjustment dynamics and investment gestation periodicity across sectors. Some extraction activities require years of planning and perhaps investors financing such projects are less concerned with short-term risks but instead have longer term planning horizons. To assess whether this might help explain the patterns of results, we re-estimated our sectoral models presented in Table 4 using both 1-year and 2-year moving averages of the political instability variable as proxies for political risk instead. The results, which are presented in Table 7 below, remain robust to taking a medium-term perspective; we continue to find a negative association between instability and FDI into

[16] These sectoral differences between the effects of political instability on greenfield FDI are statistically significant. The effect of political instability on greenfield FDI in resources and energy remains statistically insignificant when we exclude (1) the oil-importing countries (Egypt, Jordan, Lebanon, Morocco, and Tunisia) or (2) the more politically stable Gulf Council Cooperation countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates). These results are available upon request.

[17] As additional robustness checks which we do not present to conserve space, but which are available upon request, we also estimated regressions where we used as dependent variable the number of greenfield FDI projects, as well as the log of (1+the number of jobs created by greenfield FDI). Estimations using these alternative dependent variables do not lead to qualitatively different results. Notably, one still finds that greenfield investment into the resources and non-tradables sectors is not significantly correlated with the ICRG index of political risk.

[18] Countries with strong institutions fall within the 90th percentile of the governance index of 2010 based on Kaufmann et al. (2004).

non-resource tradable manufacturing and commercial services, but fail to find a significant association for FDI into the resources and non-tradable sectors.

4. Conclusions

Political instability is often alleged to undermine incentives to invest, yet empirical studies have resulted in widely varying estimates of the relationship between political instability and FDI inflows. One possible explanation for the ambiguity in empirical findings is that the relationship between political instability and FDI varies across sectors. Our analysis of quarterly greenfield FDI investments into the countries of the Middle East and North Africa attests to the importance of sectoral heterogeneity in investment sensitivity to political shocks. Political instability is associated with significantly reduced greenfield FDI flows into tradable non-resource manufacturing and commercial services. By contrast, investors in natural resources and non-tradables appear to neglect political risk. Thus, political instability in the Middle East and North Africa entrenches resource dependence and leads to Rybszynski sectoral effects, reminiscent of the Dutch disease without invoking exchange rate appreciation, by skewing investments away from tradables (cf. Corden and Neary 1982). Conversely, the relationship between political stability and aggregate greenfield FDI flows is critically contingent on the initial sectoral composition of these inflows.

The paper is also among the first to analyze the economic effects of the Arab Spring on FDI flows to the Middle East and North Africa and demonstrate that the Arab uprisings were associated with reduced investment inflows due to intensified political instability, with investments in non-resource manufacturing being the most affected. Unfortunately, political instability thus appears most detrimental to those types of investments that the region most desperately needs, notably in labor-intensive and high technology manufacturing industries with significant potential for productivity spillovers and convergence to the global technology frontier (Rodrik 2013). On the bright side, the concentration of investments in the natural resources and non-tradables may have dampened the drop in investments associated with the Arab Spring events.

Finally, the results suggest some avenues for future research. The focus on greenfield FDI flows was motivated by the fact that more than 80% of the FDI flows to MENA countries are greenfield investments. However, worldwide greenfield investments are not as dominant as a mode of entry into developing countries as they are in the MENA region. Thus, it would be important to examine to what extent political instability affects the different types of FDI flows to the developing countries. It would also be interesting to investigate the medium to long-run effects of political instability, as well as to pinpoint the precise mechanisms by which heterogeneity in sectoral effects arises.

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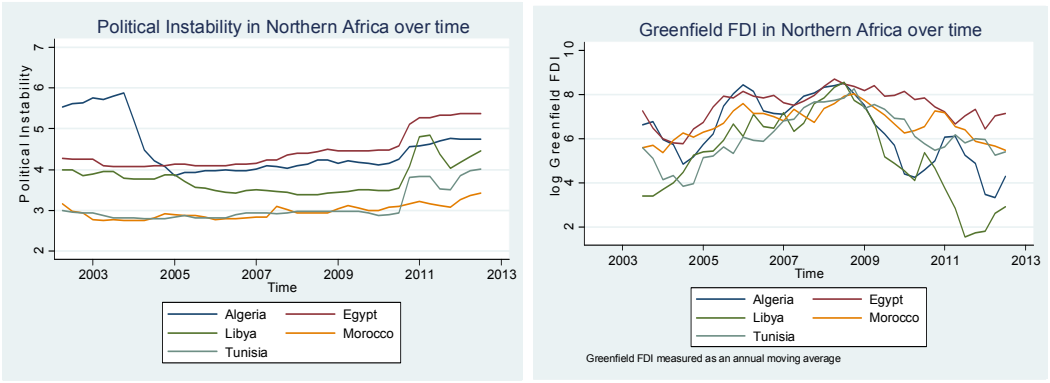
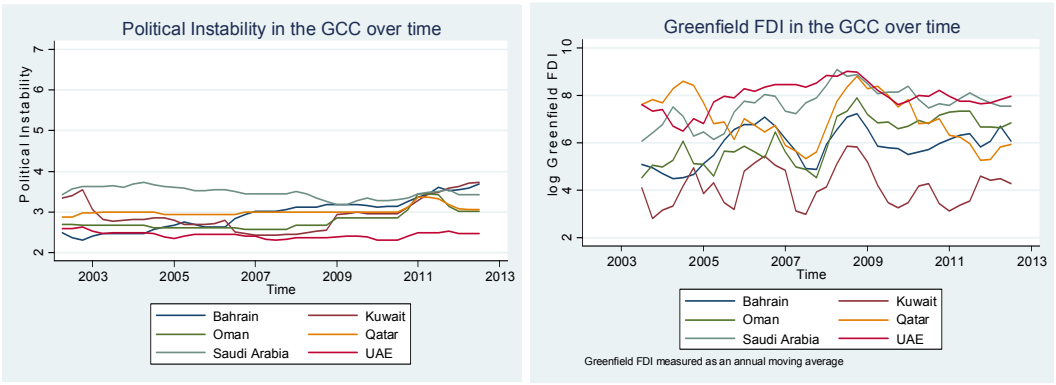
Figure 1: Political Instability and Greenfield FDI Over Time

Figures 1A and 1B: Instability (1A) and Greenfield FDI (1B) in Northern Africa



Figures 1C and 1D: Instability (1C) and Greenfield FDI (1D) in the GCC



Figures 1E and 1F: Instability (1E) and Greenfield FDI (1F) in the Middle East (non-GCC)

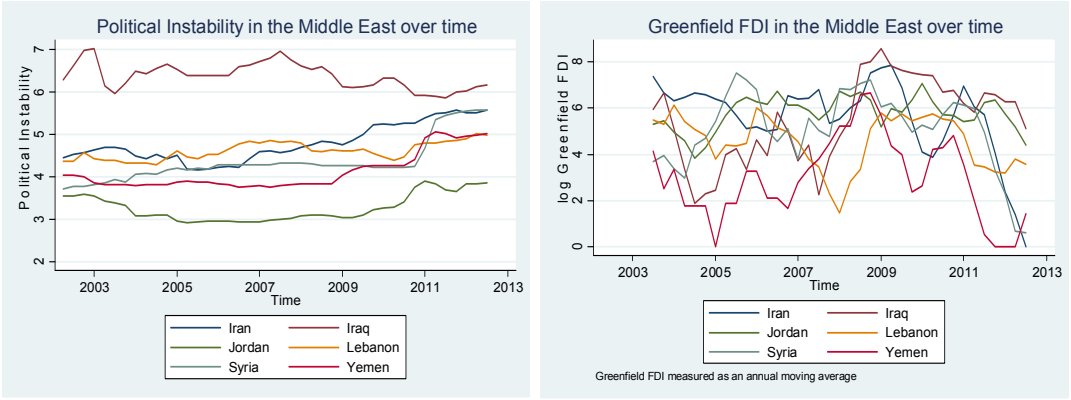


Table 1: Greenfield FDI by Destination and Sector in MENA ($US billion), 2003-2012

The Distribution of Greenfield FDI into MENA Countries by Destination and Origin 2003-2012
$US billion

	Resources and Energy	Non-resource Manufacturing	Tradable Services	Non-tradables
Algeria	21.1 (33)	19.2 (30)	12.7 (20)	11.9 (18)
Bahrain	4.1 (15)	3.7 (13)	13.7 (49)	6.4 (23)
Egypt	31.9 (31)	12.1 (12)	18.9 (18)	41.6 (40)
Iran	23.2 (67)	10.0 (29)	0.7 (2)	1.0 (3)
Iraq	24.6 (36)	1.3 (2)	18.8 (28)	23.3 (34)
Jordan	2.3 (8)	5.8 (19)	15.4 (50)	7.1 (23)
Kuwait	1.6 (18)	0.2 (2)	4.4 (52)	2.4 (28)
Lebanon	0.4 (4)	1.2 (11)	5.6 (54)	3.2 (31)
Libya	9.7 (25)	1.7 (4)	3.1 (8)	24.0 (62)
Morocco	9.9 (21)	8.1 (17)	15.4 (33)	13.8 (29)
Oman	7.5 (18)	16.4 (40)	5.0 (12)	11.9 (29)
Qatar	46.5 (45)	11.9 (12)	14.7 (14)	29.2 (29)
Saudi Arabia	69.1 (52)	30.1 (23)	23.1 (17)	11.4 (9)
Syria	11.7 (35)	2.5 (7)	14.7 (44)	4.5 (13)
Tunisia	5.2 (12)	3.8 (8)	16.3 (37)	19.3 (43)
United Arab Emirates	7.8 (6)	24.8 (19)	54.0 (41)	44.9 (34)
Yemen	6.2 (62)	0.7 (7)	1.6 (16)	1.4 (14)
Total	282.2 (30)	153.5 (16)	238.1 (26)	257.3 (28)

Source: Authors' calculations based on FDI Markets. GCC=Gulf Cooperation Council. Row percentages in parentheses.

Table 2: The Determinants of Greenfield FDI in the MENA Region, Q1 2003 – Q4 2012 Baseline Regressions

The Determinants of Greenfield FDI in the MENA region Q1 2003 – Q4, 2012
Dependent Variable: Log GFI (in millions of USD)
LSDVC Estimates

	(1) Only Political Instability	(2) Only Economic Controls	(3) Political Instability and Economic Controls	(4) Only Arab Spring	(5) Arab Spring and Economic Controls	(6) Full Specification
Political Instability $_{t-1}$	-0.89***		-0.94***			-0.86**
	(0.30)		(0.32)			(0.36)
Arab Spring Dummy $_{t-1}$				-0.94**	-0.73**	-0.31
				(0.47)	(0.37)	(0.41)
GFI $_{t-1}$	0.17***	0.16***	0.13***		0.14**	0.13**
	(0.05)	(0.04)	(0.04)		(0.04)	(0.04)
ln Industrial Production $_{t-1}$		0.75*	0.76*		0.62	0.70*
		(0.40)	(0.39)		(0.39)	(0.39)
Δ ln Industrial Production $_{t-1}$		0.81	0.64		0.84	0.67
		(0.69)	(0.69)		(0.69)	(0.70)
Inflation t-1		-12.10***	-10.35***		-11.95***	-10.44***
		(3.42)	(3.49)		(3.43)	(3.49)
Δ Exchange Rate $_{t-1}$		4.49	3.37		4.17	3.34
		(4.87)	(4.80)		(4.85)	(4.80)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	604	604	604	604	604	604
Number of Countries	17	17	17	17	17	17

Notes: Bootstrapped standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10.

Table 3: The Determinants of Greenfield FDI in the MENA Region, Q1 2003 – Q4 2012

The Determinants of Greenfield FDI in the MENA region Q1 2003 – Q4, 2012
Dependent Variable: Log GFI (in millions of USD)
Different Estimation Methods

Estimation Method	**Difference GMM**	**Systems GMM**	**OLS**	**LSDV**	**Han-Philips**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Political Instability$_{t-1}$	-1.65***	-0.37***	-0.32***	-0.99**	-1.26***
	(0.14)	(0.11)	(0.09)	(0.31)	(0.31)
GFI$_{t-1}$	0.05	0.25***	0.27***	0.10*	0.02
	(0.07)	(0.06)	(0.04)	(0.04)	(0.08)
ln Industrial Production $_{t-1}$	0.82***	0.14***	0.11***	0.79**	0.94**
	(0.26)	(0.02)	(0.01)	(0.37)	(0.38)
Δ ln Industrial Production $_{t-}$	0.38	0.98	1.21#	0.62	0.56
	(0.72)	(0.92)	(0.65)	(0.65)	(0.63)
Inflation t-1	-10.62***	-14.44***	-11.87***	-10.36***	-11.03***
	(2.88)	(3.22)	(3.78)	(3.72)	(3.65)
Δ Exchange Rate $_{t-1}$	0.88	-2.37	1.37	3.36	3.83
	(3.36)	(3.28)	(4.94)	(4.80)	(4.91)
Country FE	Yes	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	587	604	604	604	604
Number of Countries	17	17	17	17	17
Number of Instruments	502	521			
AR-2 (p-value)	0.288	0.134			
Sargan test(p-value)	0.171	0.723			
Difference-in-Sargan (p-value)		0.273			

Notes: Robust standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10.

Table 4: The Determinants of Greenfield FDI in the MENA Region, Q1 2003 – Q4 2012 Estimations by Broad Industry

The Determinants of Greenfield FDI in the MENA region Q1 2003 – Q4, 2012
Dependent Variable: Log GFI (in millions of USD)
LSDVC Estimation

Sector:	**(1) Resources and Energy**	**(2) Non-resource Manufacturing**	**(3) Tradable Services**	**(4) Non-tradables**
Political Instability $_{t-1}$	-0.02	-1.46***	-1.18***	-0.53
	(0.52)	(0.40)	(0.35)	(0.43)
GFI $_{t-1}$	0.07	0.02	0.05	0.11***
	(0.04)	(0.04)	(0.04)	(0.04)
ln Industrial Production $_{t-1}$	0.96	0.30	-0.17	0.48
	(0.67)	(0.51)	(0.45)	(0.56)
Δ ln Industrial Production $_{t-}$	0.79	-0.41	0.18	-0.04
	(1.08)	(0.82)	(0.72)	(0.89)
Inflation t-1	-7.65	-10.26**	-12.46***	-2.18
	(5.54)	(4.19)	(3.68)	(4.56)
Δ Exchange Rate $_{t-1}$	4.29	3.91	1.45	-10.95*
	(7.57)	(5.73)	(5.04)	(6.24)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	604	604	604	604
Number of Countries	17	17	17	17

Notes: Bootstrapped standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10.

Table 5: The Determinants of Greenfield FDI in the MENA Region, Q1 2003 – Q4 2012 Arab Spring Effect

The Determinants of Greenfield FDI in the MENA region, Q1 2003 – Q4 2012
Dependent Variable: Log GFI inflows (in millions of USD) by broad sector and source
LSDVC Estimates

Sector	**Resources and Energy**		**Non-resource Manufacturing**	
	Arab Spring Effect	**Full Specification**	**Arab Spring Effect**	**Full Specification**
	(1)	(2)	(3)	(4)
Arab Spring Dummy $_{t-1}$	0.08	0.10	-0.76*	-0.04
	(0.59)	(0.66)	(0.44)	(0.48)
Political Instability $_{t-1}$		-0.05		-1.44***
		(0.56)		(0.42)
Economic Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	604	604	604	604
Number of Countries	17	17	17	17

Sector	**Tradable Services**		**Non-tradables**	
	Arab Spring Effect	**Full Specification**	**Arab Spring Effect**	**Full Specification**
	(5)	(6)	(7)	(8)
Arab Spring Dummy $_{t-1}$	-0.34	0.30	-0.72	-0.52
	(0.38)	(0.42)	(0.48)	(0.53)
Political Instability $_{t-1}$		-1.27***		-0.39
		(0.36)		(0.46)
Economic Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	604	604	604	604
Number of Countries	17	17	17	17

Notes: Bootstrapped standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10.

Table 6: The Determinants of Greenfield FDI in the MENA Region, Q1 2003 – Q4 2012 Estimations by Broad Industry and Source Country Grouping

The Determinants of Greenfield FDI in the MENA region, Q1 2003 – Q4 2012
Dependent Variable: Log GFI inflows (in millions of USD) by broad sector and source
LSDVC Estimates

Sector	**Resources and Energy**		**Non-resource Manufacturing**	
Source Countries	**Strong Institutions**	**Other**	**Strong Institutions**	**Other**
	(1)	**(2)**	**(3)**	**(4)**
Political Instability $_{t-1}$	-0.19	0.09	-0.91**	-1.23***
	(0.45)	(0.42)	(0.36)	(0.41)
Economic Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	604	604	604	604
Number of Countries	17	17	17	17

Sector	**Tradable Services**		**Non-tradables**	
Source Countries	**Strong Institutions**	**Other**	**Strong Institutions**	**Other**
	(5)	**(6)**	**(7)**	**(8)**
Political Instability $_{t-1}$	-0.73**	-0.79**	-0.20	-0.45
	(0.32)	(0.40)	(0.35)	(0.43)
Economic Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	604	604	604	604
Number of Counties	17	17	17	17

Notes: Bootstrapped standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10. Note: Other= MENA+Rest of the World.

Table 7: The Determinants of Greenfield FDI in the MENA Region, Q1 2003 – Q4 2012 Alternative Definitions of Political Instability

The Determinants of Greenfield FDI in the MENA region, Q1 2003 – Q4 2012
Dependent Variable: Log GFI inflows (in millions of USD) by broad sector and source
LSDVC Estimates

Sector	**Resources and Energy**		**Non-resource Manufacturing**	
	1-Year Moving Average Political Instability	**2-Year Moving Average Political Instability**	**1-Year Moving Average Political Instability**	**2-Year Moving Average Political Instability**
	(1)	**(2)**	**(3)**	**(4)**
Political Instability	0.15	0.69	-1.37***	-1.34***
	(0.53)	(0.57)	(0.40)	(0.43)
Economic Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	604	562	604	562
Number of Countries	17	17	17	17

Sector	**Tradable Services**		**Non-tradables**	
	1-Year Moving Average Political Instability	**2-Year Moving Average Political Instability**	**1-Year Moving Average Political Instability**	**2-Year Moving Average Political Instability**
	(5)	**(6)**	**(7)**	**(8)**
Political Instability	-0.98***	-0.97***	-0.29	-0.06
	(0.35)	(0.37)	(0.44)	(0.46)
Economic Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	604	562	604	562
Number of Countries	17	17	17	17

Notes: Bootstrapped standard errors in parentheses ***p<0.01, ** p<0.05,* p<0.10.

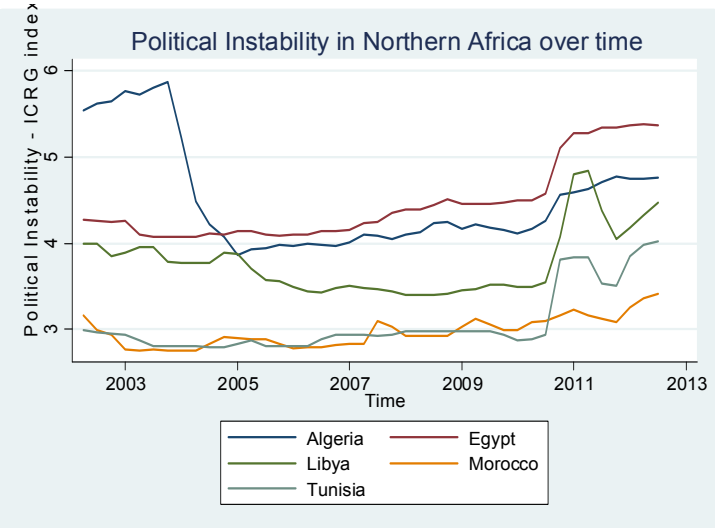
Appendix A1: Riots, Conflict Events and Political Instability in North Africa

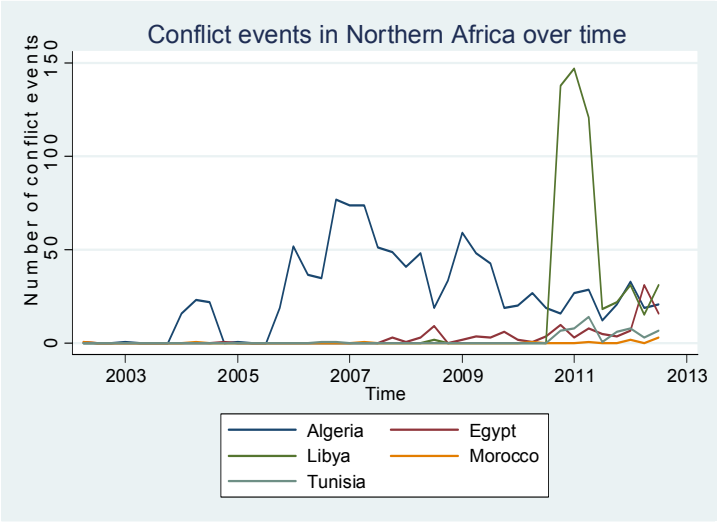
To assess whether the ICRG political risk indicator is a good indicator of political instability, we explore its correlations with arguably more objective proxies for political turmoil, notably indicators of political protests and conflict events, which we obtained from the Armed Conflict Location and Event Dataset database. The latter dataset covers only Northern African countries for the entirety of the period and is thus not available for our entire sample. Nonetheless, for the Northern African sub-sample we find strong and very significant correlations between the ICRG risk indicators and measures of political protests, conflict events, and fatalities associated with political violence – as demonstrated in Appendix A2 below. The ICRG index thus correlates strongly with objective proxies for political instability.

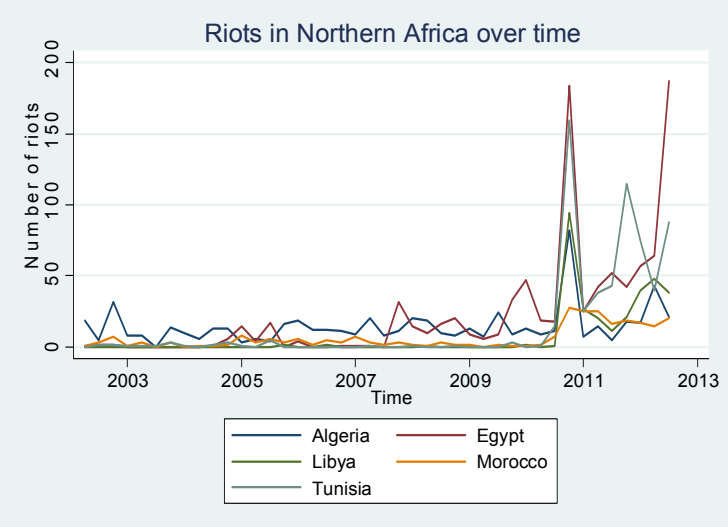
Table A1. Correlations between ICRG Measure and Objective Proxies for Political Risk

Correlations between ICRG measure and objective proxies for political risk			
ρ (N=210) **p-value**	**Political Instability (ICRG)**	**Riots (ln)**	**Battles (ln)**
Riots (ln)	0.498 *P=0.000*		
Battles (ln)	0.488 *P=0.000*	0.653 *P=0.000*	
Fatalities (ln)	0.490 *P=0.000*	0.686 *P=0.000*	0.886 *P=0.000*

For illustrative purposes, we also plot the evolution of riots and conflict events by country over time. Perhaps the strongest commonality between the graphs is the increase in political turmoil associated with the Arab Spring. The graphs also show that while the political risk measure mimics political violence, this is by no means its only determinant.




Conflict events in Northern Africa over time
Number of conflict events
0
50
100
150
2003
2005
2007
2009
2011
2013
Time
Algeria
Egypt
Libya
Morocco
Tunisia


Riots in Northern Africa over time
Number of riots
0
50
100
150
200
2003
2005
2007
2009
2011
2013
Time
Algeria
Egypt
Libya
Morocco
Tunisia

Appendix A2: Subsectors Included in the Analysis

Subsector	Broad Sector
Accommodation	Non-Tradables
Accounting, tax preparation, bookkeeping, & payroll services	Non-Tradables
Advertising, PR, & related	Tradable Services
Agriculture, construction, & mining machinery	Manufacturing*
Air transportation	Tradable Services
Aircraft	Manufacturing
Aircraft engines, other parts & auxiliary equipment	Manufacturing
All other electrical equipment & components	Manufacturing
All other food	Manufacturing
All other industrial machinery	Manufacturing
All other transportation (Automotive OEM)	Manufacturing
Alumina &aluminium production and processing	Manufacturing
Amusement & theme parks	Non-Tradables
Animal food	Manufacturing
Animal production	Manufacturing
Animal slaughtering & processing	Manufacturing
Apparel accessories & other apparel	Manufacturing
Apparel knitting	Manufacturing
Architectural & structured metals	Manufacturing
Architectural, engineering, & related services	Tradable Services
Artificial & synthetic fibers	Manufacturing
Asphalt paving, roofing, & saturated materials	Manufacturing
Audio & video equipment	Manufacturing
Automobiles	Manufacturing
Bakeries & tortillas	Manufacturing
Basic chemicals	Manufacturing
Batteries	Manufacturing
Biological products (except diagnostic)	Manufacturing
Biomass power	Resources & Energy
Boiler, tank, & shipping container	Manufacturing
Breweries & distilleries	Manufacturing
Building material & garden equipment & supplies dealers	Manufacturing
Business schools, computer & management training	Non-Tradables
Business support services	Non-Tradables
Cable & other subscription programming	Tradable Services
Cement & concrete products	Non-Tradables
Clay product & refractory	Manufacturing
Clothing & clothing accessories	Manufacturing
Coating, engraving, heat treating, & allied activities	Manufacturing
Coffee & tea	Manufacturing
Commercial & institutional building construction	Non-Tradables
Commercial & service industry machinery	Manufacturing
Communication & energy wires & cables	Manufacturing
Communications equipment	Tradable Services
Computer & peripheral equipment	Manufacturing
Computer facilities management services	Tradable Services
Computer systems design services	Tradable Services
Converted paper products	Manufacturing
Corporate & investment banking	Non-Tradables
Cosmetics, perfume, personal care & household products	Manufacturing
Couriers & messengers	Tradable Services
Crop production	Manufacturing
Custom computer programming services	Tradable Services
Cut & sew apparel	Manufacturing
Cutlery &hand tools	Manufacturing
Dairy products	Manufacturing
Data processing, hosting, & related services	Tradable Services
Educational support services	Non-Tradables
Electric lighting equipment	Manufacturing
Electrical equipment	Manufacturing
Electromedical & Electrotherapeutic Apparatus	Manufacturing
Employment services	Tradable Services
Engines & Turbines	Manufacturing
Environmental consulting services	Non-Tradables
Food & Beverage Stores (Food & Tobacco)	Manufacturing
Food product machinery	Manufacturing
Food services	Manufacturing
Footwear	Manufacturing
Forestry & logging	Manufacturing
Forging & stamping	Manufacturing
Fossil fuel electric power	Resources & Energy
Foundries	Manufacturing
Freight/Distribution Services	Tradable Services
Fruits & vegetables & specialist foods	Manufacturing

Subsector	Broad Sector
Furniture, home ware & related products (Consumer Products)	Manufacturing
Furniture, home ware & related products (Textiles)	Manufacturing
Furniture, home ware & related products (Wood Products)	Manufacturing
General medical & surgical hospitals	Non-Tradables
General purpose machinery	Manufacturing
Geothermal electric power	Resources & Energy
Glass & glass products	Manufacturing
Gold ore & silver ore mining	Resources & Energy
Grains & oilseed	Manufacturing
Guided missile & space vehicles	Manufacturing
Hardware	Manufacturing
Heavy & civil engineering	Tradable Services
Heavy duty trucks	Manufacturing
Household appliances	Manufacturing
Hydroelectric power	Resources & Energy
In-Vitro diagnostic substances	Manufacturing
Industrial building construction	Non-Tradables
Insurance	Tradable Services
Internet publishing & broadcasting & web search	Tradable Services
Investment management	Tradable Services
Iron & steel mills & ferroalloy	Manufacturing
Iron ore mining	Resources & Energy
Jewelry & silverware	Manufacturing
Laminated plastics plates, sheets & shapes	Manufacturing
Leather & hide tanning and finishing	Manufacturing
Legal services	Tradable Services
Light trucks & utility vehicles	Manufacturing
Lime & gypsum products	Resources & Energy
Machine shops, turned products, screws, nuts & bolts	Non-Tradables
Management consulting services	Tradable Services
Measuring & control instruments	Manufacturing
Medical equipment & supplies	Manufacturing
Medicinal & botanical	Manufacturing
Metalworking machinery	Manufacturing
Military armored vehicle, tank, & components	Manufacturing
Motion picture & sound recording industries	Tradable Services
Motor vehicle & parts dealers (Automotive Components)	Manufacturing
Motor vehicle & parts dealers (Automotive OEM)	Manufacturing
Motor vehicle body & trailers	Manufacturing
Motor vehicle brake systems	Manufacturing
Motor vehicle electrical & electronic equipment	Manufacturing
Motor vehicle gasoline engines & engine parts	Manufacturing
Motor vehicle seating & interior trim	Manufacturing
Motor vehicle steering & suspension components	Manufacturing
Motorcycle, bicycle, & parts	Manufacturing
Natural, liquefied and compressed gas	Resources & Energy
Navigational instruments	Tradable Services
Newspaper, periodical, book, & directory publishers	Non-Tradables
Nonferrous metal production & processing	Resources & Energy
Nonmetallic mineral mining & quarrying	Resources & Energy
Non-store retailers	Manufacturing
Nuclear electric power generation	Resources & Energy
Nursing & residential care facilities	Non-Tradables
Office supplies	Manufacturing
Offices of physicians, dentists, & other healthcare practitioners	Non-Tradables
Oil & gas extraction	Resources & Energy
Other (Building & Construction Materials)	Manufacturing
Other (Business Machines & Equipment)	Manufacturing
Other (Ceramics & Glass)	Manufacturing
Other (Consumer Electronics)	Manufacturing
Other (Consumer Products)	Manufacturing
Other (Financial Services)	Tradable Services
Other (Healthcare)	Non-Tradables
Other (Real Estate)	Non-Tradables
Other (Space & Defense)	Manufacturing
Other (Textiles)	Manufacturing
Other (Transportation)	Resources & Energy
Other amusement & recreation industries	Non-Tradables
Other chemical products & preparation	Manufacturing
Other electric power generation (Alternative/Renewable Energy)	Resources & Energy
Other electric power generation (Coal, Oil and Natural Gas)	Resources & Energy
Other fabricated metal products	Manufacturing
Other metal ore mining	Resources & Energy
Other motor vehicle parts	Manufacturing
Other non-metallic mineral products	Resources & Energy
Other petroleum & coal products	Resources & Energy

Subsector	Broad Sector
Other pipeline transportation	Resources & Energy
Other plastics products	Manufacturing
Other rubber products	Manufacturing
Other support services	Non-Tradables
Other telecommunications	Tradable Services
Outpatient care centers & medical & diagnostic laboratories	Non-Tradables
Paints, coatings, additives & adhesives	Manufacturing
Performing arts, spectator sports, & related	Non-Tradables
Pesticide, fertilizers & other agricultural chemicals	Manufacturing
Petroleum bulk stations & terminals	Resources & Energy
Petroleum refineries	Resources & Energy
Pharmaceutical preparations	Manufacturing
Pipeline transportation of crude oil	Resources & Energy
Pipeline transportation of natural gas	Resources & Energy
Plastic bottles	Manufacturing
Plastic pipes, pipe fitting & unlaminated profile shapes	Manufacturing
Plastics & rubber industry machinery	Manufacturing
Plastics packaging materials & unlaminated film & sheets	Manufacturing
Postal service	Tradable Services
Power transmission equipment	Manufacturing
Printing & related activities	Non-Tradables
Printing machinery & equipment	Manufacturing
Professional, scientific & technical services	Non-Tradables
Pulp, paper, & paperboard	Manufacturing
Radio & TV broadcasting	Non-Tradables
Rail transportation	Tradable Services
Railroad rolling stock	Manufacturing
Real estate services	Non-Tradables
Rental & leasing services	Non-Tradables
Residential building construction	Non-Tradables
Resin & artificial synthetic fibers& filaments	Manufacturing
Retail banking	Non-Tradables
Rubber hoses & belting	Manufacturing
Satellite telecommunications	Tradable Services
Schools, colleges, universities, & professional schools	Non-Tradables
Seafood products	Manufacturing
Seasoning & dressing	Manufacturing
Semiconductors & other electronic components	Manufacturing
Ships & boats	Manufacturing
Sign manufacturing	Manufacturing
Snack food	Manufacturing
Soap, cleaning compounds, & toilet preparation	Manufacturing
Soft drinks & ice	Manufacturing
Software publishers, except video games	Tradable Services
Solar electric power	Resources & Energy
Specialized design services	Tradable Services
Specialty trade contractors	Tradable Services
Sporting goods, hobby, books & music	Manufacturing
Spring & wire products	Manufacturing
Steel products	Manufacturing
Sugar & confectionary products	Manufacturing
Support activities for mining & energy	Resources & Energy
Support activities for transportation	Tradable Services
Technical, trade & other schools	Non-Tradables
Textile machinery	Manufacturing
Textiles & Textile Mills	Manufacturing
Tobacco	Manufacturing
Transit & ground passenger transportation	Tradable Services
Travel arrangement & reservation services	Non-Tradables
Truck transportation	Tradable Services
Tires	Manufacturing
Urethane, foam products & other compounds	Manufacturing
Ventilation, heating, air conditioning, and commercial refrigeration equipment manufacturing	Manufacturing
Video games, applications and digital content	Tradable Services
Warehousing & storage	Tradable Services
Waste management & remediation services	Non-Tradables
Water transportation	Tradable Services
Water, sewage & other systems	Non-Tradables
Wind electric power	Resources & Energy
Wineries	Manufacturing
Wired telecommunication carriers	Tradable Services
Wireless telecommunication carriers	Non-Tradables
Wiring devices	Manufacturing
Wood products	Manufacturing

* Note: Manufacturing refers to non-resource tradable manufacturing activities.

Appendix A3: Economic and Political Variables

Table A3: Descriptive Statistics

	Mean	Standard Deviation	Minimum	Maximum
Political Instability	3.76	1.04	2.31	7.02
ln Industrial Production	20.29	4.50	4.36	23.59
Δ ln Industrial Production	0.00	0.15	-1.86	1.38
Inflation	0.02	0.02	-0.05	0.12
Δ Exchange Rate	2.39	3.09	-1.32	9.41

Note: inflation and Δ Exchange Rate are Winsorized at the 1% level.