

The Economic Impact of Political Instability: Micro and Macro Estimates, with Applications to the Arab Spring

by

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Abstract

This thesis examines the economic effects of mass political instability events, first of the Arab Spring on Tunisia from a macro and micro perspective, and then more broadly, how economies recover from such events. In addition to an introduction and conclusion, this thesis is composed of three self-contained empirical studies, which we term as chapters hereinafter.

Chapter 2 uses the Synthetic Control Methodology to estimate the output loss in Tunisia as a result of the “Arab Spring”. Our results suggest that the loss was 5.5 percent, 5.1 percent, and 6.4 percent of GDP per capita in 2011, 2012, and 2013, respectively. These findings are robust to a series of tests, including placebo tests, and are consistent with those from an Autoregressive Distributed Lag model. Moreover, we find that investment was the main channel through which the economy was adversely impacted by the Arab Spring.

Chapter 3 extends the analysis to a micro level and explores the impact of political instability that stemmed from the Arab Spring on Tunisian firms. Using a new dataset, we show that political instability was a major concern for small and exporting firms as well as for those that were operating in the tourism sector, those that have suffered from vandalism and those that were located in the interior region of Tunisia. Most importantly, we find that political instability was the most damaging constraint to firm growth after the Arab Spring.

Finally, chapter 4 examines the economic implications of mass political instability events, defined as a political regime crisis accompanied by mass civil protest. Using the synthetic control methodology, it is shown that these events significantly reduce output in the short run, and even more so in the long run (up to five years later), although there is considerable heterogeneity across countries. This result was further supported by Difference-in-Difference regression estimates. In addition, we find that countries with increasing investment rates and lower previous income levels are associated with a fast recovery following mass political instability. On the other hand, democratization is found to impede recovery. These results are robust to using different sets of regressors and to the exclusion of potential outliers.

Publications

The main findings of Chapter 2 have been already published in the World Bank Economic Review (with Simon Appleton and Michael Bleaney):

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Chapter 1 – Introduction

Dating back to the 19th and 20th centuries, researchers have focused on examining the effects of large-scale armed conflicts. For example, Von Clausewitz (1812) focused primarily on the relation between economic conditions and the capacity to prosecute a war, whereas Lenin (1916) looked at the relation between fragile economic fundamentals and the probability of a conflict occurring. Over the past four decades, however, the world has witnessed an exponential rise in the number of large-scale revolutions and mass civil uprisings, which outpaced the increase in the number of armed conflicts: the number of protests, strikes and demonstrations increased from 1,140 in 1975 to 14,161 in 2014,¹ while that of civil conflicts rose from 30 in 1975 to 128 in 2014.² This unprecedented surge in mass civil uprisings, has reignited interest among researchers to study the economic effects of political instability events categorized by Skaperdas et al. (2009) as low-level conflicts. While economists disagree on many policy issues (Machlup, 1965), they tend to agree on the strong interplay between political instability and economic activity (Ades and Chua, 1997).

Within this context, this thesis focuses on exploring the economic implications of the Arab Spring on Tunisia. The Arab Spring, named after the largely unanticipated public demonstrations aimed at replacing autocratic regimes by democratic systems across several Arab countries, has been considered by many as one of the political landmarks of the twenty-first century (Gelvin, 2015; Malik and Awadallah, 2013). It originated on December 17, 2010 in the Tunisian city of Sidi Bouzid when Mohamed Bouazizi, a Tunisian fruit vendor, set

¹ These numbers were calculated based on data from the Cross-National Time Series (CNTS) database.

² The data on the number of armed conflicts was taken from the Uppsala Conflict database. It was accessed on 20 January, 2017 using the following link: <http://ucdp.uu.se/>. We start from 1975 because this is the earliest year for which data on armed conflicts is available in the Uppsala Conflict database.

himself on fire after the police confiscated his vegetable cart and humiliated him. This event was the catalyst for large-scale protests that eventually toppled Zine El Abidine Ben-Ali's 24-year reign on January 2011. The winds of change that swept across Tunisia triggered a domino effect in several Arab countries, including Bahrain, Egypt, Libya, Syria and Yemen.

Despite the successful, albeit rocky, transition to a democratic regime crowned by the adoption of a new constitution in 2014 (World Bank, 2015), Tunisia is still struggling to recover to its pre-revolution economic conditions. In particular, GDP per capita grew on average by 0.1 percent during the 2011-2013 period compared to a 2.5 percent average during the three years prior to the revolution. In addition, the fiscal and current account deficits widened by 4.8 and 3.6 percentage points of GDP between 2010 and 2013, respectively. From the labour side, total and youth unemployment rates were, by 2012, 4.6 and 8.2 percentage points higher than their corresponding levels on the eve of the revolution. Notwithstanding the worldwide interest in the Arab Spring, until now, empirical research that has focused on the economic effects of these uprisings is still relatively scant (Acemoglu et al., 2014; World Bank, 2013a) with no econometric work of any kind focusing exclusively on Tunisia, the birthplace of the Arab Spring. The first two chapters of this thesis therefore aim to fill this gap by examining the macro and micro economic effects of the Arab Spring on Tunisia.

Chapter 2 employs the Synthetic Control Methodology (SCM) to estimate the output loss in Tunisia as a result of the "Arab Spring" between 2011 and 2013. While SCM has been recently used in various fields of economics (trade, labour, macro, etc.), our study is the first to employ this technique in order to evaluate the economic impact of large-scale revolutions. This method, which originates from the microeconomic literature where it is natural to estimate the causal effect of a shock (or treatment) by comparing the outcome of the treated units with that of the controls, fits very well in our context where standard time-series

econometric models fail because of the small number of data points. In particular, we find that the Arab Spring had a negative effect on Tunisia's aggregate economy: GDP per capita was lower than that of its counterfactual in the absence of the Arab Spring (Synthetic Tunisia) by an estimated US\$ 600 (5.5 percent), US\$ 574 (5.1 percent) and US\$ 735 (6.4 percent) in 2011, 2012, and 2013, respectively. Thus, in the first year (2011) the loss was already substantial, and, by 2013, the shortfall had increased somewhat further. In addition, our analysis reveals that the drop in investment was the major channel through which the Arab Spring affected the Tunisian economy, most likely due to the increased uncertainty associated with the uprisings and the protracted and uncomfortable transition to a democratic system.

Motivated by the increase in political instability in Tunisia since the outbreak of the Arab Spring, chapter 3 complements the analysis of chapter 2 by examining the economic impact of political instability from a micro-level perspective, specifically on Tunisian firms. In particular, this chapter has two main goals. First, it explores which characteristics can best explain firms' perception of political instability as a business constraint. To that end, we use a newly available firm-level dataset which, unlike previous business enterprise surveys, contains an explicit measure of political instability, defined as the manager's response to how much he/she considers political instability as a constraint to the firm's operations. Our empirical analysis shows that political turmoil was a major concern for small and exporting firms as well as for those that were operating in the tourism sector, those that have suffered from acts of vandalism and those that were located in the Interior region of Tunisia. These findings add to the previous research that has explored which firm attributes were mostly associated with business obstacles (Beck et al., 2005; Kounouwewa and Chao, 2011; Vargas, 2015) although none attempted to focus on political instability per se. Second, this chapter examines which constraint is the most damaging to companies operating in a politically unstable country such as Tunisia after the Arab Spring. We find strong evidence that political

instability was the most damaging obstacle to Tunisian firms during the post-revolutionary period. The existing literature on the relationship between different business environment obstacles and firm growth (Aterido et al., 2011; Ayyagari et al., 2008; Fisman and Svensson, 2007; Hallward-Driemeier et al., 2006; among many others), traditionally tackled this problem through a technical and apolitical lens. Our analysis suggests that, when it comes to revolution-torn countries, policy makers should first and foremost shield the economy from destabilizing political and security events.

While Tunisia and other countries in the Arab world were significantly impacted by the Arab Spring revolutions that started in 2011, Georgia and Ukraine, which experienced similar mass revolutions that toppled the existing regimes in 2004 and 2005, respectively, maintained relatively stable growth paths during the corresponding post-revolution years. Although scholars have extensively studied the effects of political instability on different macroeconomic outcomes (Aisen and Veiga, 2013; Alesina and Perotti, 1996; Barro, 1991; Carmignani, 2003; Fielding, 2003; Fielding and Shortland, 2011; Jong-A-Pin, 2009), the issue of whether countries recover from political instability events remains largely unexplored in the political economy literature.

Consequently, chapter 4 of this thesis examines the economic impact of mass political instability events, defined as a political regime crisis accompanied by mass civil protest, on a set of thirty countries. In particular, the main aim of this chapter is to examine whether economies recover after such events and whether there are heterogeneous effects across countries. To answer these questions, we add to the literature by deriving a new measure of recovery using SCM. This technique has two significant advantages over the conventional panel econometric models that only allow for evaluating the average treatment effect for the whole sample (Aisen and Veiga, 2013; Alesina and Perotti, 1996; Barro, 1991; Carmignani,

2003; Fielding, 2003; Jong-A-Pin, 2009). First, the SCM enables us to examine the causal impact of political instability on output over time. Second, and more importantly, this framework allows for a country-by-country assessment of the impact of mass political instability, a feature that can be very useful in providing further insights into any heterogeneous effects of political instability. Our estimates from the SCM counterfactuals (estimated output dynamics in the absence of mass political instability) indicate that mass political instability events tend to have, on average, an immediate and permanent adverse impact on a country's per capita income. The impact is permanent in the sense that there is no significant recovery of output back towards its counterfactual level. Nevertheless, we uncover some degree of heterogeneity in economies' reactions to mass political instability events, an important contribution to the literature which earlier estimated average treatment effects. Political regime crises not accompanied by mass civil protest are also examined, and are found to have negligible negative output effects. Finally, our new measure of output gap between the actual and synthetic country enables us to contribute further to the literature by exploring, for the first time, which variables correlate with economic recovery after mass political instability. Our regression analyses suggest that poorer countries, and those which invest more, tend to experience a faster economic recovery. On the other hand, democratization is found to be inversely associated with recovery. These findings are robust to controlling for a wide range of explanatory variables as well as to omitting countries that were impacted by large idiosyncratic shocks during the recovery period and others for which we could not obtain a reliable counterfactual prior to the mass instability event.

The remainder of this thesis is structured as follows. Chapters 2, 3 and 4 contain the aforementioned studies. Finally, chapter 5 concludes this thesis by providing an overview of the main research findings, as well as their limitations and methodological issues, together with a brief indication of potential avenues for further research.

Chapter 2 - The Impact of the Arab Spring on the Tunisian Economy

2.1 Introduction

For decades, many Arab countries have been dominated by dictators who restricted political liberties, controlled economic resources, and ignored social problems. As a result, feelings of discontent and frustration have built up over the years among citizens, especially the youth. The Arab Spring, named after the largely unanticipated public demonstrations aimed at replacing autocratic regimes by democratic systems across several Arab countries, has been considered by many as one of the political landmarks of the twenty-first century (Gelvin, 2015; Malik and Awadallah, 2013).³ The Arab Spring was sparked on December 17, 2010 by the self-immolation of Mohamed Bouazizi, a Tunisian fruit vendor, after the police confiscated his vegetable cart and humiliated him. This event sparked large-scale protests that eventually toppled Zine El Abidine Ben-Ali's 24-year reign on January 2011. The winds of change that swept across Tunisia triggered a domino effect in several Arab countries, including Bahrain, Egypt, Libya, Syria and Yemen.

Notwithstanding the worldwide interest in the Arab Spring, to the best of our knowledge, there are almost no studies that have quantified its economic impact. In this chapter we use the Synthetic Control Methodology (SCM) as developed by Abadie and Gardeazabal (2003) to estimate the macroeconomic impact of the Arab Spring on the Tunisian economy from 2011 to 2013. More broadly, this chapter also contributes to the literature on the economic impact of conflicts and revolutions.

³ "Not since the collapse of the Berlin wall and the demise of the Soviet Union has change swept so suddenly across a geographical region" (E-International Relations, 2011, p. 3).

The synthetic control method creates a synthetic control (counterfactual) as a weighted average of other control units (in our case countries) that were not affected by the treatment (in our case the Arab Spring), such that the outcome and characteristics of the treated unit and its synthetic counterpart are as similar as possible during the pre-shock period. Our “Synthetic Tunisia”, which is our counterfactual for Tunisia in the absence of the Arab Spring, is constructed using data between 1990 and 2010. The effect of the Arab Spring is then estimated by comparing real GDP per capita for actual and synthetic Tunisia during the period 2011-13.

The main results of this chapter are as follows. The Arab Spring had a negative effect on Tunisia’s aggregate economy: per capita GDP was lower than that of synthetic Tunisia by an estimated US\$ 600 (5.5 percent), US\$ 574 (5.1 percent) and US\$ 735 (6.4 percent) in 2011, 2012 and 2013, respectively. Thus, in the first year (2011) the loss was already substantial, and by 2013 the shortfall had increased somewhat further. In addition, we find that the drop in investment was the main channel through which the economy was adversely impacted by the Arab Spring.

To assess the robustness of our results, we perform various sensitivity tests. In the SCM, it is typically the case that only a minority of the candidate control units end up with non-zero weights, so first we check if our results might be sensitive to the omission of the included countries. We find that excluding any of these control countries does not alter the path of the baseline synthetic Tunisia after 2010. In addition, we perform what are known as time series falsification tests in order to check that, if we applied the methodology at earlier years than 2010, when Tunisia did not experience a shock, the SCM correctly identifies a no shock effect after these dates (2000 and 2008). We find that our results are robust as Tunisia’s per capita GDP did not drop relative to its synthetic counterpart after 2000 or even after 2008. The

construction of synthetic Tunisia obviously depends on the criteria used to make it as similar as possible to actual Tunisia in the pre-shock period, so we also investigate the effect of amending these criteria. Finally, we compare our results with alternatives based on regression analysis. In summary, all these tests confirm the robustness of our results. However, we fully acknowledge the limitations of our study as the SCM does not fully account for some unobserved factors and possible idiosyncratic shocks that might have occurred around or after the Arab Spring.

A particular concern is the high level of oil prices in the years 2011 to 2013 relative to the previous decade. As we discuss in section 2.6, it is possible that this could have affected synthetic Tunisia through asymmetric or non-linear effects on oil exporters and oil importers, even though synthetic Tunisia, like actual Tunisia, was in approximate balance on its oil trade. Moreover, to the extent that the high oil prices of this period can be attributed to interruptions in supply associated with the Arab Spring, the control group may not have been immune to the shock, as our methodology assumes. In reality, however, world oil production does not appear to have fallen significantly below trend after the Arab Spring, as increased output from Saudi Arabia compensated for reduced supply from Libya, so the role of the Arab Spring in the high oil prices is unclear. In our results, GDP per capita in synthetic Tunisia follows a fairly smooth trend, with no sign that 2011 marks a major economic shock caused by higher world oil prices.

The remainder of this chapter is structured as follows. Section 2.2 presents the main political and macroeconomic developments that happened in Tunisia in the aftermath of the Arab Spring. Section 2.3 reviews the relevant literatures on the causes and economic consequences of conflicts. Section 2.4 describes the empirical methodology and the data used, while section 2.5 presents the results. This is followed by section 2.6 which includes some

robustness checks and section 2.7 which determines the main channel through which the economy was impacted by the Arab Spring. Finally, section 2.7 concludes.

2.2 Major Political and Economic Developments in Tunisia after the Arab Spring

In this section, we explore the main political and macroeconomic developments that happened after the Tunisian revolution (2011-2013) and we present some stylized facts regarding the main channels through which the uprisings might have impacted the Tunisian economy.

2.2.1 Political Developments in Tunisia

The Tunisian revolution⁴ was sparked by the self-immolation of Mr. Mohammed Bouazizi, a street vendor, on December 17, 2010. Bouazizi's suicide was followed by a series of uprisings, that spread quickly across Tunisia after twenty-one Tunisians were killed by government snipers in the province of Kasserine (Gelvin, 2015). These uprisings, which demanded the departure of President Ben Ali, were successful in ousting him after the army stood down on January 13, 2011. Since then, Tunisia's political transition has experienced three distinct periods, as documented by Kerrou (2013).⁵ The first phase stretched from January 14, 2011, when the reign of President Ben Ali came to an end after 24 years in power, to October 23 2011, when a new National Constituent Assembly was elected. This period was characterized by the formation of a new government headed by Beji Caid Essabi and the election of a National Constituent Assembly.

The second phase, which extended from 2012 till the end of 2013, was marred by a political crisis between the secular opposition represented by the National Salvation Front (NSF) and the Islamic-led government dominated by the El-Nahda party. For instance, in

⁴ The Tunisian revolution is also referred to as the "Jasmine" revolution.

⁵ Figure A2.1 in the appendix presents a timeline of the major political events that happened in each of the three episodes.

August 2012, thousands protested in Tunis (capital of Tunisia) against the cabinet's decision to reduce women's rights. The tension intensified, however, after the assassination of Chokri Belaïd, an eminent figure of the Tunisian opposition on February 6, 2013. This was followed by violent clashes between police and protesters when commemorating, on April 9, 2013, the martyr's day as well as the assassination of opposition figure Mohamed Brahmi. These events incited several strikes and calls for the government's resignation.

The third and final period was characterized by the end of the political crisis and the building of foundations for a sustainable, democratic and inclusive political system. In October 2013, the El-Nahda party agreed to form a caretaker government of technocrats assigned with organizing new elections in 2014. As a result, a consensus was reached in December 2013 between the main civil society institutions and major political parties on a blueprint to accomplish a democratic transition process that included the nomination of a new non-politically affiliated government. The parliament approved a new constitution in January 2014, and the formation of a non-partisan technocratic government, headed by Mehdi Jomaa. Then, in October 2014, parliamentary elections took place and Nidaa Tunis, the main secular party in Tunisia, secured the most seats followed by the El-Nahda party. The transition to a democratic system was finalized in December 2014 when presidential elections were held and Beji Caid Essebsi, the candidate of Nidaa Tunis, won against Mouncef Al-Marzouki.⁶

⁶ The relation between economic development and democratization is one of the most studied issues in the political science literature. Boix (2003), Boix and Stokes (2003) and Epstein et al. (2006) have all argued in favour of the modernization theory: higher income per capita causes political regimes to transition to democracies. On the other hand, Przeworski (2000) argued that "democratic transitions occur randomly, but once there, countries with higher levels of GDP per capita remain democratic" (Epstein et al., 2006, p. 551). In the case of the Arab Spring, we favour the latter explanation as Tunisia, which in 2010 had a GDP per capita of US\$ 10,768 and Yemen, which in the same year had a per capita GDP of US\$ 3,663, were both under similar dictatorships.

2.2.2 Possible Channels through Which the Arab Spring Impacted Growth

Prior to the Arab Spring (AS) which started with the Tunisian uprisings, international institutions had a rosy outlook for the Tunisian economy. The IMF (2010) and the World Bank (2010), for example, were forecasting Tunisia's real GDP growth for 2011 at 4.8 and 5 percent, respectively. However, actual data released after the uprisings shows that the Tunisian economy contracted by 1.9 percent in 2011 and recorded modest growth rates afterwards.

To better understand the channels through which the Arab Spring affected the Tunisian economy, we refer to the annual growth rate of the Gross Domestic Product (GDP) series from 2000 to 2013 as published by the Tunisian National Institute of Statistics (TNIS). As illustrated in Table 2.1, investment was the main drag on economic activity after 2011, and its growth rate was largely impacted by the intensity of security and political developments between 2011 and 2013. More specifically, investment dropped by 12.7 percent in 2011 when the Tunisian revolution erupted, grew by 6.1 percent in 2012 with the relatively improved security conditions, albeit largely reflecting a low-base effect, and then decelerated to a 0.2 percent growth in 2013 as the political crisis between the secular opposition and the Islamic brotherhood intensified. The decline in investment activity was also reflected by the 25.2 percent crash in FDI inflows in 2011 as shown in Figure 2.1 (below). In addition to the observed drop in the level of investment, Burger et al. (2016) argued that the composition of foreign investment has changed as a result of the increased political turmoil. In particular, they found evidence of lower investment inflows in the non-resource tradable sectors, in contrast to investments in resource rich sectors which were found to be insensitive to political instability.

Table 2.1: Growth Rates of GDP Variables from the Demand Side

Growth (%)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Real GDP	4.3	4.8	1.7	5.5	6.0	4.0	5.7	6.3	4.5	3.1	3.0	-1.9	3.9	2.4
Imports of Goods and Services	7.0	13.7	-3.0	0.3	2.7	0.0	7.6	9.6	5.4	-8.2	15.3	-2.4	5.4	-1.8
Exports of Goods and Services	5.8	11.7	-3.5	0.0	5.5	4.5	4.3	11.8	2.8	-7.0	10.6	-4.3	4.3	1.9
Total Consumption, of which	5.5	5.3	4.1	5.2	5.0	4.4	5.0	5.5	4.7	4.0	4.1	4.5	4.6	3.2
Public	9.9	2.8	6.3	7.4	4.3	2.8	7.0	5.5	4.4	5.8	3.7	6.1	5.2	4.3
Private	4.3	6.0	3.5	4.6	5.2	4.8	4.5	5.5	4.8	3.6	4.3	4.1	4.4	3
Total Investment	4.3	8.4	-1.7	-1.8	1.0	2.7	9.5	6.3	5.3	3.5	4.3	-12.7	6.1	0.2

Source: Tunisian National Institute of Statistics.

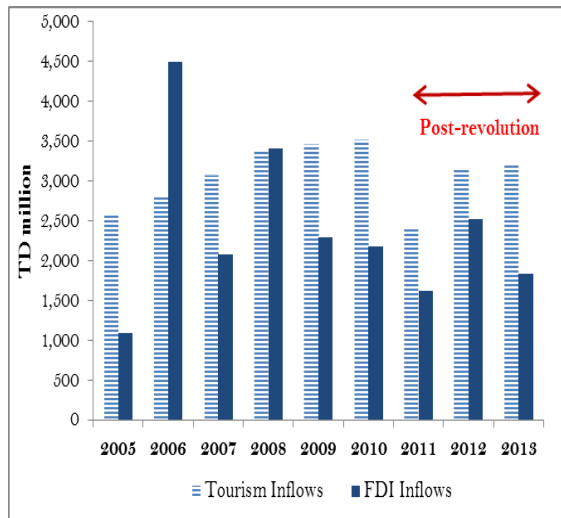
Furthermore, and as reported in Table 2.2, the revolution had an adverse effect on real exports through lower mining output and tourism inflows. In particular, the tourism industry – a pillar of the Tunisian economy accounting for, on average, 6.1 percent of real GDP between 2001 and 2010 and employing around 26 percent of the total labour force (World Bank, 2013b) – has witnessed a substantial decline since 2011. Indeed, the sector's contribution to growth plummeted from a 1.5 percentage points (pp) average between 2004 and 2010 to a 0.7 pp average contraction between 2011 and 2013. Figure 2.1 also shows that tourism inflows, which dropped by 30.9 percent in 2011, were yet to recover to their pre-revolution level by 2013.

Table 2.2: Breakdown of Total Real Exports (%)

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Exports of Goods and Services	100	100	100	100	100	100	100	100	100
Exports of Goods (FOB); of which:	72.3	73.1	75.5	76.1	72.4	73.9	78.9	76.4	77.2
Mining Exports	5.1	4.9	5.6	10.7	6.2	6.8	4.1	4.7	4.6
Other Exports	67.3	68.3	69.9	65.4	66.2	67.1	74.8	71.6	72.6
Exports of Services; of which:	27.7	26.9	24.5	23.9	27.6	26.1	21.1	23.6	22.8
Tourism	13.8	13.3	12.0	10.9	12.9	11.1	7.6	9.1	9.0
Other Services	13.9	13.6	12.5	12.9	14.7	15.0	13.5	14.5	13.8

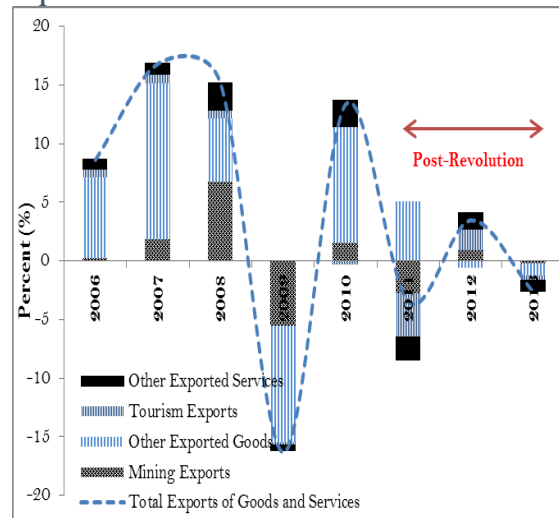
Source: Tunisian National Institute of Statistics and author's own calculations.

Figure 2.1: FDI and tourism inflows



Source: Central Bank of Tunisia.

Figure 2.2: Contribution to growth of total exports



Source: Tunisian National Institute of Statistics and author's own calculations.

Likewise, the mining sector, which accounted for 9.2 percent of total exported goods in 2010 (pre-revolution), was hit severely in the aftermath of the revolution as protests, by underprivileged citizens demanding jobs and better living standards, paralyzed the phosphate industry in the city of Gafsa. Data published by TNIS show that in 2011 the value of mining exports plummeted by 39.7 percent due to a 56.6 percent drop in phosphate (DAP) exports. However, during 2011 the international price of DAP increased by 23.6 percent (from 500.6 US\$/mt in 2010 to 618.8 US\$/mt in 2011) meaning that the drop in DAP exports was driven by a reduction in the quantity supplied as a consequence of the uprisings. Indeed, “according to the Compagnie des Phosphates de Gafsa (CPG), phosphate production was only 2.5 million tons in 2011, compared to 8 million in 2010. The amount of phosphate produced fell to under 3 million” (African Development Bank, 2012, p. 5). This has largely contributed to the 4.3 percent contraction of total real exports in 2011 as illustrated in Figure 2.2.⁷ On the other hand, consumption growth did not witness a significant changing pattern after 2011.

⁷ $Contribution\ to\ total\ exports_t = [growth\ rate_t \times Share\ of\ total\ Exports_{t-1}]/100.$

These negative spillovers of the Arab Spring coincided with the economic slowdown in the Euro area, which is the major trading partner of Tunisia, accounting on average for 80 percent of total exported goods between 2000 and 2013. As represented in Figure 2.3, the dynamics of exports of goods and services are highly correlated (with a correlation coefficient of 64 percent) with the health of the Euro area economy proxied by the real GDP growth rate, even though the former dropped more in 2011.

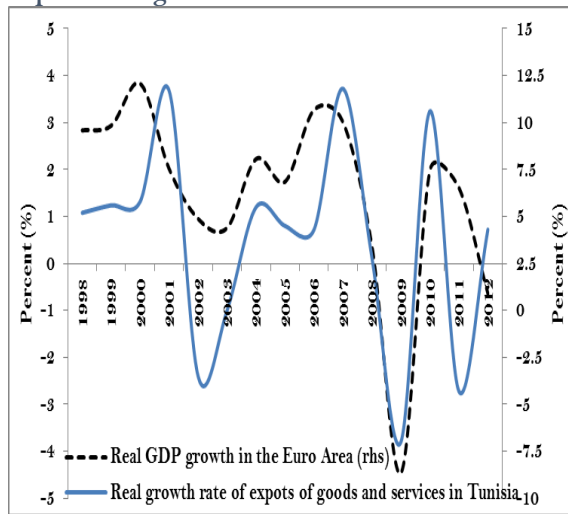
2.2.3 Macroeconomic Developments in Tunisia between 2011 and 2013

The economic downturn observed in 2011, induced the Central Bank of Tunisia (CBT) to adopt an expansionary monetary policy aimed at boosting economic growth by (i) lowering its key interest rate by 100 basis points (bps) between May and September 2011, (ii) reducing the reserve requirement ratio of commercial banks from 12 to 2 percent, and (iii) giving, in 2011, TD⁸ 3.6 billion (US\$ 2.6 billion) to commercial banks in order to boost liquidity. Consequently, and despite the uprisings, credit to the economy grew, in real terms, by 13.6 percent during 2011. However, the 1.5 pp increase in the 12-months inflation rate between December 2011 (4.2 percent) and August 2012 (5.7) prompted the central bank to tighten its monetary policy.⁹ As a result, the CBT increased its policy interest rate four times since 2012, for a cumulative of 125 basis points. In addition, and as shown in Figure 2.4, the increasing inflation rate resulted in negative real money market interest rates since September 2011. However, credit growth rate to the total economy was decelerating, in real terms, during this same period, dropping to 7 and 6.7 percent in 2012 and 2013, respectively.

⁸ TD refers to Tunisian Dinar.

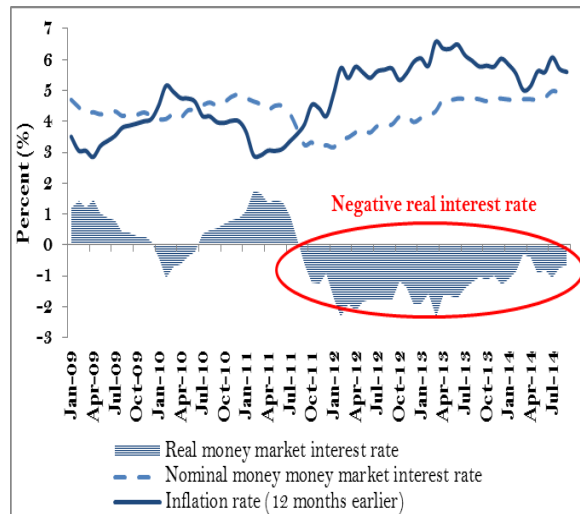
⁹ According to the IMF (2013), the increase in the inflation rate was caused by (i) higher energy prices and (ii) higher local food prices as a result of the increased demand stemming from the large inflow of Tunisian workers who fled the war in neighbouring Libya.

Figure 2.3: Correlation between Tunisian exports and growth in the Euro area



Source: World Development Indicators and the Tunisian National Institute of Statistics.

Figure 2.4: Interest rates and inflation.



Source: Central Bank of Tunisia and author's own calculations.

From the fiscal side, the authorities embarked on an expansionary program aimed at mitigating the impact of the revolution on local citizens. According to an IMF (2012) report, the government recruited, on a net basis, 20 thousand new employees which increased the total wage bill of the government by 14 percent in 2011. Furthermore, a 4.7 percent increase on civil servants' wages was implemented in 2011, while security forces were provided with additional benefits. As a result, the total public sector wage bill increased from 10.7 percent as a share of GDP in 2010 to 12.4 percent in 2013. This increase was coupled with a significant rise in transfers and subsidies after the revolution.¹⁰ More precisely, new social measures were introduced such as compensating households that were affected by the uprisings and providing allowances to the martyrs' families. According to the data available in the IMF reports (2013, 2014), transfers and subsidies increased from 3.6 percent of GDP prior to the revolution to 7.6 percent in 2013. These policy responses help explaining why consumption growth, reported in Table 2.1, remained almost unchanged after the Arab Spring.

¹⁰ Many governments in the Middle East and North Africa region (Algeria, Bahrain, Egypt, Jordan Kuwait, Morocco, Oman and Tunisia) responded to the social demands in the onset of the Arab Spring by increasing fuel and food subsidies (World Bank, 2011a, p. 14).

Consequently, and in addition to lower revenues due to the strikes in the mining sector, the overall fiscal deficit widened by 4.8 percentage points of GDP between 2010 and 2013.

Tunisia's external position has also deteriorated rapidly in the aftermath of the revolution. The current account deficit skyrocketed, increasing from an average of 3 percent of GDP between 2000 and 2010 to 8 percent in the post-revolution period (2011-2013). This deterioration was driven by the widening trade deficit resulting from lower tourism inflows and mining exports (see above). The larger current account deficit coupled with lower FDI inflows forced the central bank to use a significant amount of its foreign reserves to support the local currency. More specifically, the central bank sold US\$ 2 billion of its foreign reserves in 2011, equivalent to 21 percent of its 2010 holdings.

2.3 Literature Review

Dating back to the 19th and 20th centuries, researchers have been interested in understanding the relation between economic dynamics and conflicts. For instance, Von Clausewitz (1812) focused primarily on the relation between economic conditions and the capacity to prosecute a war, whereas Lenin (1916) looked at the relation between fragile economic fundamentals and the probability of a conflict occurring. While the political turmoil in Tunisia was not an armed conflict, estimating the economic impact of lower-level internal conflicts belongs to the same strand of literature as quantifying the impact of large-scale civil wars. According to Skaperdas et al. (2009), strikes, protests and road blockades, which all fall under the category of low-level conflicts, are common examples of political instability events that could have disruptive effects on the economy, similar (qualitatively) to those of armed conflict. Empirical research in this field is divided into two closely related categories: (i) the

causes/correlates of conflicts¹¹ and (ii) the economic consequences of conflicts. For the purpose of this chapter, we will briefly review both literature strands while focusing more on the latter.¹²

2.3.1 Correlates of Civil-War Onset

What are the factors that tend to increase the probability of a civil war onset? The answer to this question has often been characterized in the literature by the “greed versus grievance” dichotomy introduced by Collier and Hoeffler (2004b). The former theory suggests that economic motives (such as lower GDP growth, higher population, higher natural resources, etc.) explain the onset of conflicts, while the latter advocates for political and social incentives (such as bad institutions, high inequality, etc.) as being the main drivers of wars. Based on numerous studies, presented below, we argue that both the greed (economic) and grievance (social and political) hypotheses play a major role in explaining the onset of conflicts.

A consensus among scholars was reached that higher income per capita, economic growth, smaller populations, and a longer time at peace decrease the likelihood of a civil war occurrence.¹³ Moreover, countries that are adjacent to states suffering from civil wars are more prone to experience a civil war themselves. This is referred to in the literature as the “neighborhood effect” defined as “armed conflicts in one state make neighboring countries more prone to violence” (Buhaug and Gleditsch, 2008, p. 230). Indeed, Sambanis (2001) found, using a set of 161 countries over a period of 40 years, that civil wars in neighbouring countries

¹¹ Extensive reviews of the theoretical methodologies used in the literature to model the causes of conflicts can be found in chapter 3 of Blattman and Miguel (2010) and chapter 3 of Collier and Hoeffler (2007).

¹² Recall that the aim of this chapter is to quantify the economic cost of the Arab Spring on Tunisia rather than explaining its causes.

¹³ See Collier and Hoeffler (2004b), Fearon and Laitin (2003), and Sambanis and Hegre (2006).

increase the risk of a conflict in the local country; his results were further supported by Murdock and Sandler (2002), Sambanis and Hegre (2006) and Buhaug and Gleditsch (2008).

In parallel, researchers such as Ross (2003), Collier and Hoeffler (2004b) and Fearon (2004) found that the likelihood and the length of a conflict are positively and significantly related to the dependence on natural resources (oil, minerals, gold and diamond).¹⁴ High youth unemployment is also considered as a factor that could trigger conflicts, even though to a lesser extent. Based on surveys undertaken for the preparation of the World Bank's World Development Report published in 2011, "unemployment and idleness were cited as the primary reasons for young people to join gangs or rebel movements, reinforcing the links between social inequality and violence" (World Bank, 2011b, p. 80).

In addition to the economic correlates mentioned above, social and political factors are found to be important drivers of civil wars and internal conflicts. Recent empirical findings suggest that institutions and governance correlate negatively with the recurrence and onset of civil wars. Fearon (2010) found, using three different measures of governance quality¹⁵ and based on set of 150 to 180 countries, observed during 10 to 65 years, that states with lower governance indicators (corruption, government effectiveness, and the rule of law) are more likely to suffer from conflicts. Moreover, and while the impact of ethnicity on the onset of

¹⁴ For an extensive review regarding this line of research we refer the reader to McNeish (2010).

¹⁵ The three different measures are (i) the World Bank's Country Policy Institutional Assessment (CPIA) Index, (ii) the Worldwide Governance Indicator, and (iii) indicators from the International Country Risk Guide.

crisis generated a large debate in the literature in the 2000's,¹⁶ recent studies have found evidence of a positive and significant causal effect from ethnicity to conflicts.¹⁷

Finally, research pertaining to the effects of democratic systems on conflicts remains inconclusive. In their respective papers, Collier and Hoeffler (2004b) and Fearon and Laitin (2003) found that the level of democracy in a country is insignificant in being a driver of conflicts. On the other hand, Goldstone et al. (2000) and Sambanis and Hegre (2006) found a negative impact of the democracy level.

Linking this literature to the Tunisian context, we argue that the probability of a revolution onset was low ex-ante (before 2011) given that most economic and developmental indicators (primary school enrolment rate, life expectancy at birth, infant mortality rate, etc.) were improving in the decade preceding the uprisings.¹⁸ Particularly, GDP per capita grew on average by 3.4 percent during the 2000-2010 period compared to a 2.8 percent growth in the Middle East and North Africa region as depicted in Figure 2.5 (below). In addition, inequality, proxied by the World Bank's GINI index dropped from 40.8 percent in 2000 to 35.7 percent in 2010. Furthermore, Tunisia's neighbouring countries did not experience any major conflict before the revolution, hence eliminating any neighbourhood effect. Ethnic

¹⁶ Collier and Hoeffler (2004b) found using a set of 98 countries during the period 1960-1999 that ethnic difference reduces the risk of a conflict risk. Fearon and Laitin (2003) used a panel data for 161 countries from 1945 to 1999 and found that ethnic difference is not a significant driver of civil wars. These results, however, were "surprising given the robust negative relationship between economic performance and some social divisions, as well as popular perceptions of their centrality in driving conflicts" (Blattman and Miguel, 2010, p. 27). On the contrary, Sambanis (2001) found using a dataset of 161 countries covering the period 1960-1999 that ethnic diversity is positively correlated with civil wars onset.

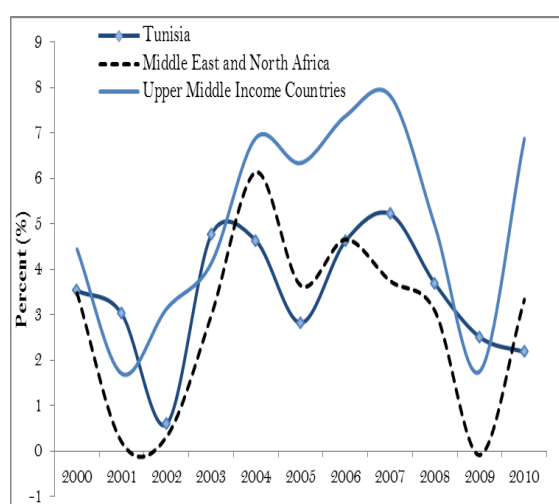
¹⁷ See Bleaney and Dimico (2011), Esteban et al. (2012) and Gomes (2013).

¹⁸ For a full list of the development indicators that improved before the uprisings, please refer to Box O.1 in the World Bank (2014) report.

diversity was also not a concern as around 99 percent of the Tunisians follow the Islamic (Sunni) religion.

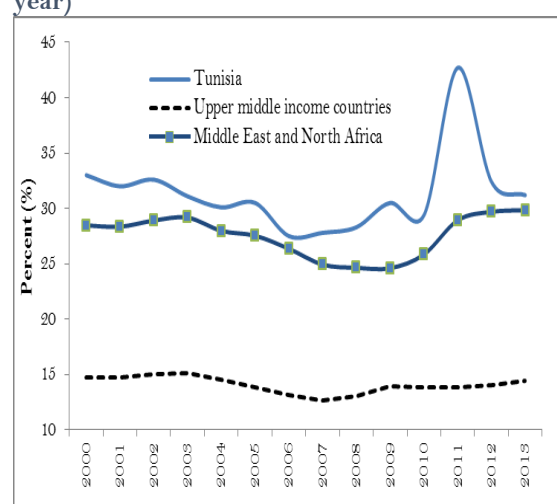
However, three particular indicators, were showing signs of a possible uprising in Tunisia. First, not only was the unemployment rate high, standing at 13 percent in 2010, but the unemployment among youth (between 15 and 24 years old) was soaring at 27 percent prior to the revolution.¹⁹ Figure 2.6 shows that this was much higher than the average youth unemployment rate observed in upper-middle-income countries and the Middle East and North Africa region. What aggravated the situation further was the rising share of unemployed educated people out of total unemployment before the uprisings as illustrated in Figure 2.7. The resulting exclusion from the economic and social life coupled with feelings of inferiority (low status) and discontent engendered resentment among Tunisians, especially among the youths who represent the biggest share of the population as shown in Figure 2.8. In addition to the high unemployment rates, the pre-revolution era was characterized by low-added value jobs, mainly in the informal sector, offering very low salaries (World Bank, 2014).

Figure 2.5: GDP per capita growth rate



Source: World Development Indicators.

Figure 2.6: Youth unemployment rate (15-24 year)



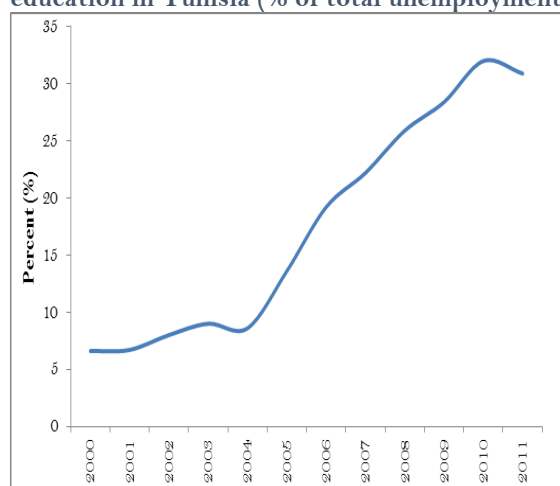
Source: World Development Indicators.

¹⁹ The argument that unemployment increases the likelihood of youth participation in armed and lower-intensity conflicts has been supported empirically by Urdal (2006) and Oyefusi (2010), respectively.

Second, regional disparities and income inequality between Tunis (the capital) and the developed areas in the east and the inner regions of the country were substantial. According to El-Khawas (2012, p. 7), “unemployment was more than 22 percent in Kasserine and Gafsa in the interior, regions that were among the first to challenge the regime”.

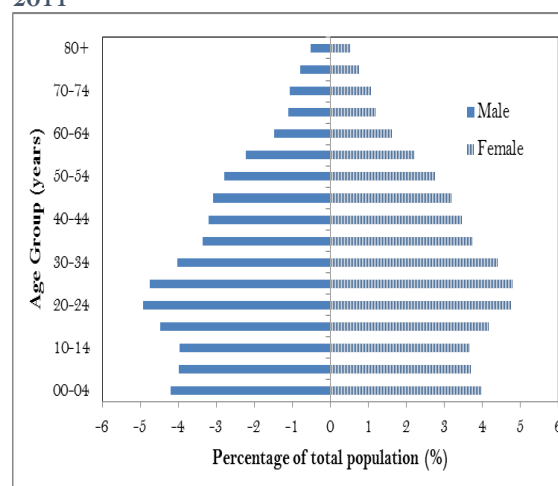
Third and finally, the high corruption of the ruling family increased the discontent among the population. According to Rijkers et al. (2017), firms that were politically connected to president Ben Ali’s family (i.e. either partially or fully owned) produced 5 percent of all private sector output, and accounted for 16 percent of all net private sector profits on the eve of the revolution (in 2010). Despite establishing a good governance and anti-corruption commission in the new constitution that was ratified in 2014, corruption seems to have escalated following the uprisings. A recent poll by Transparency International (2016) reveal that 64 percent of Tunisians saw a rise in corruption compared to the previous year.

Figure 2.7: Unemployment with tertiary education in Tunisia (% of total unemployment)



Source: World Development Indicators.

Figure 2.8: Tunisia’s population group age in 2011



Source: Tunisian National Institute of Statistics.

2.3.2 Economic Cost of Conflicts

The literature regarding the economic cost of conflicts originated with the work of Organski and Kugler (1977) who examined the impact of World Wars I and II on European economies. Since then, an extensive literature has emerged trying to quantify the impact of conflicts on

economic outcomes across different countries and periods. Different techniques have been adopted in the literature to calculate the economic costs of conflicts. In this section, we present an overview of these techniques.²⁰

The cost accounting method, which is based on summing the direct and indirect costs of conflicts, has been used with multiple scenarios by Bilmes and Stiglitz (2006) to quantify the economic cost of the Iraqi war for the United States. They found that economic costs would range between US\$ 1 and US\$ 3 trillion according to a conservative and moderate scenario, respectively. Arunatilake et al. (2001) also adopted this approach to estimate the cost of the Sri Lankan civil war that spanned from 1984 to 1996. They found that the direct and indirect costs of the civil war were 61.9 and 99.3 percent of Sri Lanka's 1996 GDP, respectively. While the accounting approach is easy to perform when national accounts are well developed, researchers should avoid double-counting. For instance, "when education decreases during conflict because all males aged 20-30 years old (who tend to be relatively highly educated) die on the battlefield, this is a cost that is already included in the loss of life section" (De Groot et al., 2009, p. 17).

A second methodology is based on cross-country regressions where macroeconomic variables (savings ratio, investment ratio, etc.) are regressed on indicators that can be used as proxies for conflicts. For example, Venieris and Gupta (1986) analysed, using a sample of 49 countries, the relation between the savings-to-GDP ratio and a Socio-Political Instability Index (SPII) accounting for the regime type, the number of demonstrations and the number fatalities. They found that, as expected, a higher SPII lowers the savings to GDP ratio. Moreover, Alesina and Perotti (1996) showed, using an SPII they developed based on the

²⁰ Extensive reviews of the different techniques are provided by De Groot et al. (2011), Gardeazabal (2010) and Skaperdas et al. (2009).

number of coups and political assassinations in a sample of 71 countries averaged over the period 1960-1985, that political instability lowers the investment-to-GDP ratio. These cross-country regression approaches, nevertheless, suffer from the following drawbacks. First, they do not capture the dynamic relation between conflicts and macroeconomic variables over the conflict cycle. Second, the result for a sample of countries cannot be extrapolated to single countries as individual countries might react differently to the same conflict. Third, OLS estimates using cross-section studies may suffer from endogeneity problems due to possible reverse-causality as deteriorating macroeconomic fundamentals increase the likelihood of a conflict.

Panel-data models have also been applied in various ways. One of the most cited studies in the literature is the pioneering work by Collier (1999) in which he estimated the impact of armed conflicts on economic activity (proxied using real GDP growth rate) during a civil war and five years after the end of a war. He employed GDP growth rates from the Penn World Tables and combined that with the Small and Singer (1982; 1994) datasets which were considered as the most reliable databases on civil wars at that time. Using a panel dataset formed of 92 countries of which 19 experienced a civil war between 1960 and 1989, he ran an OLS regression and found, after controlling for fixed and random effects, that civil wars have, on average, a 2.2 percent negative and statistically significant impact on economic growth every year. In addition, he argued that the impact of civil wars is not uniform across all sectors of the economy. In particular, “the sector intensive in capital and transactions (manufacturing), and the sectors which supply capital (construction) and transactions (transport, distribution, and finance), contract more rapidly than GDP as a whole. The sector with opposite characteristics (arable subsistence agriculture) expands relative to GDP” (Collier, 1999, p. 181). Collier’s result about the negative relation between conflicts and GDP growth was supported by Blomberg et al. (2004) who examined, using a panel dataset of 177

countries over the 1968-2000 period, the impact of internal and external conflicts as well as terrorism. They found evidence that external conflicts (terrorism) had the highest (lowest) impact on per capita GDP growth rate. Moreover, Hoeffler and Reynal-Querol (2003) found, using a panel of 211 countries (78 of which were in conflict) during the 1960-1999 period, that armed conflicts reduce GDP growth rate by 2.4 percent per year.²¹ Moreover, Stewart et al. (1997) examined the impact of internal conflicts on the GDP per-capita of nine countries from 1965 to 1990.²² They found, after comparing the rank of each country (based on GDP per capita) vis-à-vis its geographical region, that eight out of nine countries experienced a drop in GDP per capita during the conflict period.

While the previous two approaches are widely used to analyse the impact of a conflict on a pool of countries, studying the economic consequences over time for a single country necessitates the use of time series techniques. In particular, Vector Autoregression (VAR) models have been employed to examine the dynamic relation between certain macroeconomic variables and indicators measuring the intensity of conflicts. In particular, Enders and Sandler (1991) used a VAR model to estimate the impact of transnational terrorist attacks on the number of tourist arrivals in Spain between 1970 and 1988 using monthly data. They found (i) a negative relation between the two variables and (ii) that an increase in the number of terrorist attacks Granger caused a drop in the tourist arrivals, whereas the converse did not hold. While VAR models have the advantage of being simple in terms of estimation and determining the direction of causality between the variables, they require high frequency data (monthly or quarterly) with a large number of periods, which in our case is not available.

²¹ This result is very close to the 2.2 percent estimate found by Collier (1999).

²² The nine countries are: El Salvador, Ethiopia, Guatemala, Liberia, Mozambique, Nicaragua, Somalia, Sudan, and Uganda.

Finally, Besley and Mueller (2012) relied on a Markov switching model to quantify the impact of peace dividend in Northern Ireland, proxied by changes in house prices.²³

In recent years, a new methodology, called the Synthetic Control Method (SCM), has been used to estimate the impact of conflicts. In our context, the SCM involves the choice of a synthetic control, constructed as a weighted average of other countries selected to resemble as closely as possible the pre-shock economic features of Tunisia, to estimate what would have happened to the Tunisian economy in the absence of the Arab Spring. Abadie and Gardeazabal (2003) were the first to use this methodology in order to quantify the output forgone due to conflicts. Specifically, they analysed the economic costs of the conflict in the Basque region of Spain from 1975 till 1997, by constructing a synthetic region composed of two other Spanish regions (Catalonia and Madrid) as a counterfactual. Based on this counterfactual, they concluded that per capita GDP in the Basque region fell by around 10 percent compared to what would have been the case if the conflict did not occur.²⁴

Two recent studies have attempted to quantify the impact of the Arab Spring.²⁵ First, the World Bank (2013a) used a VAR model to examine the impact of the Syrian conflict (captured by an exogenous dummy variable) on total consumption and investment in Lebanon between 2012 and 2014. They found that investment and consumption dropped by 1.2 and 2.6 percent, respectively, as a result of the Syrian conflict. Second, Ianchovichina and Ivanic (2016) examined the economic effects of the Syrian war and the rise of the Islamic State on Egypt,

²³ In addition to the econometric techniques, the Institute for Economics and Peace (2013) and Fearon and Hoeffler (2014) used other methods to estimate the economic cost of conflicts.

²⁴ For recent applications of SCM to a variety of socio-economic issues, refer to the first paragraph of section 4.6.1.

²⁵ Regarding the causes of the Arab Spring, Campante and Chor (2012) found evidence that the expansion of education in the Arab world have contributed to the uprisings. In addition, Arampatzi et al. (2015) found that life dissatisfaction appears to have played a significant role in the outburst of the Arab revolutions.

Iraq, Jordan, Lebanon, Syria and Turkey. In particular, they employed a global computable general-equilibrium model to quantify the output lost due to trade disintegration as a result of the Arab Spring. Their simulations suggested that all six countries were adversely impacted by these conflicts, with Syria and Iraq bearing the brunt of the losses.

2.4 Methodology

In this section, we present the main building blocks of the SCM, which we will adopt to estimate the economic cost of the Arab Spring on Tunisia's economy, followed by a description of the data.

2.4.1 Theoretical Basis

The SCM, as developed by Abadie and Gardeazabal (2003) and Abadie et al. (2010),²⁶ creates a synthetic control (counterfactual), as a weighted average of other control units (representing countries, states or regions) that were not affected by the treatment (representing shocks, events or interventions), such that the outcome (in our case per capita GDP) of the synthetic control and that of the treated unit are the same during the pre-treatment period. After constructing the appropriate synthetic control, the causal impact of the treatment is simply calculated as the difference between the outcome of the treated and that of the synthetic control in the post-treatment period.

In our case, we have panel data composed of Tunisia and R other countries from 1990 to 2013 (24 years), where R is a set of countries that were not affected by the Arab Spring (hereinafter referred to as controls). The per capita GDP of the real Tunisia ($GDP_{tun;t}$) and that of a synthetic Tunisia ($GDP_{syn;t}$), constructed as described below, are compared for the

²⁶ For a detailed methodology of the synthetic control model and the corresponding mathematical derivations, see Abadie et al. (2010).

period after the Arab Spring, and the impact in each year is measured as the difference between them.

The GDP per capita of synthetic Tunisia is constructed as follows. Let X_r be an $(x \times 1)$ vector of observed covariates (or characteristics) correlated with real GDP per capita (outcome of interest) for every control country $r \in R$.²⁷ In addition, consider a vector of weights $W = (w_1, \dots, w_R)$ such that $w_{r \in R} \geq 0$ and $\sum_{r=1}^R w_r = 1$. Each particular combination of W will yield a different synthetic control for Tunisian GDP per capita during the pre-Arab Spring (pre-AS) period. Abadie et al. (2010) proved that when we choose $w_{r \in R}^*$ such that

$$\sum_{r=1}^R w_r^* GDP_{r;t} = GDP_{tun;t} \quad \text{for } t = 1990, \dots, 2010 \quad (2.1)$$

and

$$\sum_{r=1}^R w_r^* X_{r;t} = X_{tun;t} \quad \text{for } t = 1990, \dots, 2010 \quad (2.2)$$

the synthetic control estimator, $Impact_t$, for $t = 2011, \dots, 2013$ would be unbiased. Therefore, the vector of optimal weights $W^* = (w_1^*, \dots, w_R^*)'$ assigned to each control country, $r \in R$, is estimated by minimizing the difference between the vectors of pre-AS (before 2011) covariates and real GDP per capita of Tunisia on the one hand and the respective vectors corresponding to the synthetic Tunisia on the other hand.²⁸ In simple terms, the optimal synthetic Tunisia should not only have the same GDP per capita as Tunisia during the pre-AS period, but it should also have the same values of the covariates (in our case, measures of the structure of the economy and social indicators).

²⁷ The vector of covariates will be defined later in section 2.4.2.

²⁸ To perform this minimization, we used the “synth” package developed by Abadie et al. (2010) for STATA.

After finding the optimal weights that satisfy equations (2.1) and (2.2), the real GDP per capita for the synthetic Tunisia is estimated using

$$\widehat{GDP}_{Synth;t} = \sum_{r=1}^R w_r^* GDP_{r;t} \text{ for } t = 1990, \dots, 2013. \quad (2.3)$$

The impact of the Arab Spring on Tunisia's per capita GDP can then be calculated as follows:

$$Impact_t = GDP_{tun;t} - \widehat{GDP}_{Synth;t} \text{ for } t = 2011, \dots, 2013. \quad (2.4)$$

In other words, the economic impact of the Tunisian revolution is equal to the difference, over the period 2011-2013, between the actual Tunisian GDP per capita and the estimated counterfactual GDP per capita had the Arab Spring not happened.

Before proceeding to describe the data, we should note that SCM depends on the following four assumptions. First, the exogenous shock affecting the treated unit should have no impact on the outcome of the control units during the post-treatment period; otherwise we will have a biased estimate. Second, and in order to control for possible unobserved factors affecting the outcome variable, Abadie et al. (2010) argue that increasing the number of pre-intervention periods reduces the likelihood of a bias stemming from unobserved variables. Third, the shock itself must, by definition, be exogenous and largely unexpected ex-ante, otherwise there might be some anticipation effects resulting in reverse causation (Billmeier and Nannicini, 2013). Fourth, and more importantly, the synthetic control should have, approximately, the same structural characteristics (predictors of the outcome variable) as the treated unit during the pre-treatment period. If potential control units are not structurally similar to the treated unit we are interested in, then any difference between the outcome of the two series (treated and its synthetic counterpart) may only be due to structural breaks rather than from the exogenous shock itself (Geddes, 2003; George and Bennett, 2005).

Compared with traditional empirical methods used in the literature to estimate the economic impact of conflicts/revolutions, the SCM has several advantages. First, the SCM can be used in situations where time series regressions (VAR or VECM models) fail due to data limitations such as a relatively small number of time series observations. For example, in our case, we only have quarterly data for Tunisian GDP from Q1-2000 to Q4-2014 which only gives us 60 observations. The SCM method overcomes this problem. Second, and in contrast to constructing counterfactuals based on linear time trends or using forecasts, counterfactuals constructed using SCM capture global economic shocks that may occur in the post-treatment period. Third, Abadie et al. (2010) showed that the SCM is a generalization of the Difference-in-Difference (DiD) method used in micro-econometrics to evaluate the impact of a treatment on an aggregate outcome. However, unlike DiD and fixed effects models, which only accounts for time-invariant effects, the SCM captures the effects of time-changing unobservable variables (Billmeier and Nannicini, 2013).

2.4.2 Data

To construct Synthetic Tunisia, we use country-level panel data for Tunisia and all the other 182 countries available in the 2015 version of the World Development Indicators (WDI) database published by the World Bank from 1990 to 2010.²⁹ Given that the Gross Domestic Product (GDP) is the most widely employed variable to measure the state of the aggregate economy in the economic literature, it will be used as the outcome variable. In particular, we use the GDP per capita adjusted to PPP at 2011 constant prices, which we refer to in the rest of the chapter as GDP per capita also downloaded from the WDI database.

²⁹ Ideally, we would have restricted our set of potential control units to countries in the MENA region that share similar characteristics with Tunisia (such as language, culture and weather). However, this is not feasible as most MENA countries have been impacted by the Arab Spring and therefore we would not be able to construct a synthetic Tunisia. Consequently, our set of controls consisted of the global sample of economies, “as this helps to regain comparable GDP levels in the comparison countries” (Billmeier and Nannicini, 2013, p. 992).

As explained earlier, suitable control countries should not have been exposed to a major exogenous shock from 2011 onwards, otherwise these may impact the per capita GDP path of the Synthetic Tunisia, leading to a biased estimate. For that reason, we exclude from our sample: (i) countries that were impacted, directly or indirectly, by the Arab Spring; (ii) countries that were hit by an unexpected exogenous shock (such as natural disasters, conflicts or adverse economic spillovers from neighbouring countries) after 2010; and (iii) countries that had to be bailed out to avoid a complete collapse of their economies, such as Cyprus and Greece. For a list of the 32 omitted countries and a brief explanation on why we excluded them, we refer the reader to Table A2.1 in the appendix of this chapter.³⁰ In addition, 36 countries were excluded from our sample of controls as a result of missing data in some of the covariates we use in the analysis (more details about the choice of covariates are presented in the paragraph below). Consequently, our final set of controls consists of 114 countries listed in Table A2.2 in the appendix.

As previously discussed, and in addition to having approximately the same GDP per capita, the constructed synthetic Tunisia should also have similar economic fundamentals to Tunisia prior to the Arab Spring (equation 2.2). In this case, we require Tunisia and its synthetic counterpart to have approximately the same structure in terms of the composition of expenditure³¹ (consumption, investment (denoted as GCF), imports and exports) and sectoral value added³² (value added of the agriculture, industry and services sectors), all as a share of GDP, in the pre-treatment period. We also require Tunisia and its synthetic counterpart to have a similar level of life expectancy at birth and secondary school enrolment

³⁰ All tables and figures starting with an “A2” are available in the appendix of this chapter.

³¹ According to the expenditure approach: $GDP = Consumption + Investment + Exports - Import$. Note that consumption accounts for both private and government components.

³² According to the value added (output) approach: $GDP = Value\ added\ (Agriculture + Industry + Services)$.

rate, which are both components of the widely used Human Development Index.³³ Data for all the covariates were downloaded from the World Bank WDI database. For each covariate, except for the human development indicators (life expectancy at birth and secondary school enrolment)³⁴ we use two values: the 1990–2000 average and the 2001–2010 average. The rationale behind this division is to ensure that the constructed synthetic Tunisia does not only have the same average economic fundamentals as Tunisia during the whole pre-AS period but also a similar dynamic structure over time. If, on the other hand, we use the 1990–2010 averages we could end up choosing countries that had a different economic evolution compared to Tunisia, hence leading to biased estimates. Finally, and in order to maximize the goodness of fit of synthetic Tunisia with actual Tunisia during the pre-AS period, we add to our set of covariates the average GDP per capita during the following periods: 1990–1994, 1995–1999, 2000–2004 and 2005–2010.³⁵ Table A2.3 in the appendix provides a definition and the source of each variable used, while Table A2.2 displays the variables’ average corresponding to each country in the set of 114 donor controls.

³³ We also experimented with additional variables that capture institutional factors (ICRG and the Polity2 Indices) to test the robustness of our results, but their addition did not alter our result substantively as illustrated in Figure A2.2.

³⁴ The within variation of the life expectancy variable during the pre-revolution period (1990–2010) is only 2 years, meaning that this variable did not witness a significant variation across time, hence, taking the average would be sufficient. Regarding the secondary school enrolment variable, we attempted to divide our sample into two subsamples (1990–2000 and 2001–2010), however we noticed that for many countries, data for this variable was missing during the first subsample and as a result many countries would have been dropped from the analysis leading to a significant loss of data. Therefore, we considered the average over the whole pre-revolution period (1990–2010). This rationale also applies to all the other covariates.

³⁵ The use of period averages as covariates is a common technique followed by most researchers that employed the Synthetic Control Methodology (Abadie et al., 2010, 2015; Abadie and Gardeazabal, 2003; Campos et al., 2014; Gobillon and Magnac, 2016). Moreover, in a recent paper, Kaul et al. (2016) showed theoretically and empirically that when using the SCM, we cannot use all the lagged variables of the outcome variable (in our case per capita GDP) as this will render the other covariates irrelevant, leading to severe biases in the estimated impact of the treatment.

2.5 Estimating the Economic Impact of the Arab Spring

2.5.1 Empirical Results

Table A2.4 in the appendix shows that Synthetic Tunisia is best reconstructed as a weighted average of 14 countries, with Poland, Republic of Congo, Sri Lanka, India, Mauritius and Belize having the highest weights. These six countries were assigned the largest weights because their GDP per capita followed approximately the same dynamics as the Tunisian GDP per capita before the Arab Spring (see Figure 2.9 below).³⁶ More importantly, Table A2.2 shows that Tunisia and these six countries had very similar socio-economic structures before 2011: all these economies were driven by consumption expenditure (services) from the demand (supply) side, life expectancy rate hovered around the early 70s, and the education level as reflected by the secondary school enrolment was relatively high.³⁷ Table 2.3 displays the average pre-2011 values of the variables of interest for Tunisia, Synthetic Tunisia and the simple average of the 114 countries in the set of control countries. We notice that Synthetic Tunisia approximates the pre-2011 values of the GDP per capita covariates for Tunisia much more closely than the average of the 114 countries. Indeed, synthetic Tunisia is very similar to actual Tunisia in terms of the pre-2011 variables: GDP per capita, the respective shares of investment (GCF), consumption, imports, exports, agriculture, service (all as a ratio of GDP), and life expectancy at birth as well as the secondary school enrolment rate. In summary, Table 2.3 suggests that Synthetic Tunisia, constructed using SCM, has almost the same economic and social structure as the actual Tunisia during the pre-2011 period.

³⁶ From Figure 2.9 we observe that Sri Lanka's per capita GDP was increasing rapidly after 2009. This improvement in economic activity was mainly driven by the reconstruction efforts and rising consumption following the 26 year war that ended in 2009. While this fast growth, which averaged 6.4 percent between 2009 and 2013, may bias our results upwards as it was not purely driven by structural economic activity, our findings are not affected by excluding Sri Lanka from our sample (see the robustness analysis in section 2.6 below).

³⁷ The Republic of Congo was an exception where the life expectancy rate and the secondary school enrolment were much lower during the pre-2011 period.

Table 2.3: Averages of Economic and Social Characteristics of GDP*

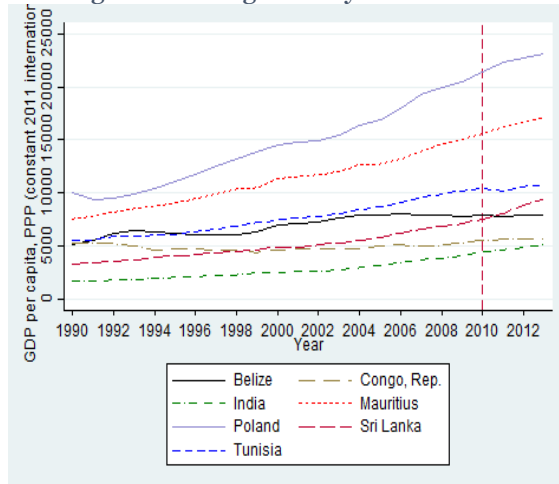
	Tunisia	Synthetic Tunisia	Average of 114 Control Countries
GCF average 1990-2000	26.0	25.9	21.5
GCF average 2001-2010	24.3	24.4	22.6
Consumption average 1990-2000	78.1	78.2	83.4
Consumption average 2001-2010	78.5	78.5	81.3
Imports average 1990-2000	45.1	45.1	41.7
Imports average 2001-2010	48.8	48.8	46.3
Exports average 1990-2000	41.0	41.0	36.7
Exports average 2001-2010	45.9	45.9	42.3
Agriculture 1990-2000	14.9	16.3	18.9
Agriculture 2001-2010	9.7	11.1	14.7
Services 1990-2000	53.3	53.9	51.3
Services 2001-2010	60.2	57.7	55.0
Life Expectancy at birth (years)	72.5	68.0	66.1
Secondary School Enrollement (%)	70.6	71.7	67.2
GDP per capita average 1990-1994 (US\$)	5,810	5,801	12,068
GDP per capita average 1995-1999 (US\$)	6,636	6,627	13,093
GDP per capita average 2000-2004 (US\$)	7,895	7,877	14,585
GDP per capita average 2005-2010 (US\$)	9,656	9,634	16,742

Source: Author's own calculations. * All variables are in percentage of GDP (%) unless stated otherwise.

Figure 2.10 depicts the paths of per capita GDP for actual and synthetic Tunisia, which are very similar up to 2010 but diverge markedly thereafter. Therefore, each Tunisian citizen is estimated to have lost, on average, US\$ 600 (5.5 percent of GDP per capita), US\$ 574 (5.1 percent of GDP per capita) and US\$ 735 (6.4 percent of GDP per capita) by 2011, 2012 and 2013, respectively.³⁸ In section 2.5.2, we apply standard placebo tests to these results and in section 2.6 we perform various robustness tests, and discuss some of the SCM limitations.

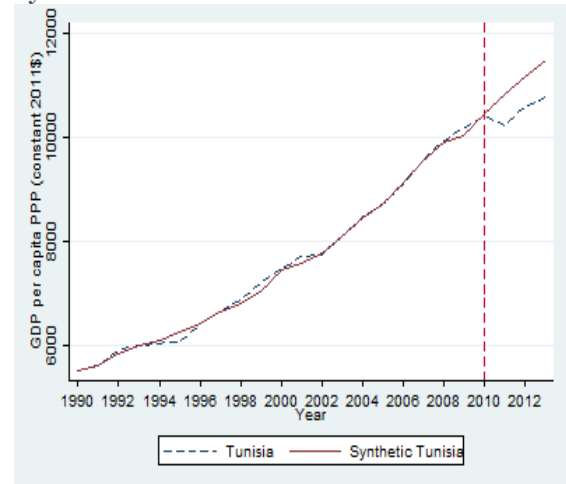
³⁸ We do not think our results suffer from an endogeneity problem as (i) the uprisings were unanticipated ex-ante (Gelvin, 2015) and (ii) the economic performance in Tunisia was relatively good prior to the revolutions. Indeed, “Tunisia enjoyed a 4.4 percent average annual growth in GDP over 2000-2010, placing the country among the leading performers in the MENA region. This level of growth was accompanied by rapid poverty reduction, from 32 percent in 2000 to 16 percent in 2010 using the national poverty line. Similarly, the percentage of the population below the international US\$2 per day (PPP) poverty line dropped from 12.8 percent in 2000 to 4.3 percent in 2010.” (World Bank, 2014, p. 24). However, we should note that despite the overall improved economy, growth was not totally inclusive as Rijkers et al. (2017)

Figure 2.9: GDP per capita: Tunisia and countries with highest six weights in Synthetic Tunisia



Source: World Development Indicators.

Figure 2.10: GDP per capita: Tunisia vs Synthetic Tunisia



Source: Author's own calculations.

It is important to bear in mind, however, that these estimates also reflect some mitigating measures taken by the local authorities (discussed in section 2.2.3) in order to boost economic activity in the aftermath of the Arab Spring. In addition, the international community stepped up its assistance to Tunisia, including a US\$ 500 million loan approved by the World Bank board in June 2011 and a US\$ 1.74 billion Stand-by-Agreement signed with the IMF two years later.

2.5.2 Testing the Validity of the Results

Unfortunately, we cannot refer to standard p-values to make statistical inferences about our estimates given that we are not using a standard regression estimation technique and our sample size is relatively small. Instead we use “Placebo or Falsification Tests”, which are also known in the statistical literature by the name of “Randomization Inference Tests” (Bertrand et al., 2004). In a general context, the rationale behind these tests is simple: when SCM is applied to units (countries) that were not subject to the treatment (Arab Spring), we should not observe a significant divergence between the post-2010 outcomes for the treated unit and its synthetic counterpart. In essence, we want to examine whether repeating the synthetic

found that firms connected to Ben Ali and his family outperformed their competitors (higher employment, output, and profits) mainly due to preferential regulatory treatments.

control analysis for countries that, in 2011, were not subject to the Arab Spring would show the same negative shock to output as Tunisia. If this is the case, then the observed drop in Tunisia's per capita GDP cannot be attributed to the Arab spring.

Figure 2.11 presents the results of the placebo tests applied to the 114 control countries in 2011. While the thick blue dotted line represents the previously estimated difference for Tunisia, the other colored lines are the difference between the GDP per capita corresponding to each of the 114 control countries and their respective synthetic counterparts constructed between 1990 and 2010. We can see from Figure 2.11 that the post-2010 lines for countries other than Tunisia are quite widely spread, suggesting, at first glance, that the negative impact generated by the Tunisian revolution was not unusually large. However, for many of these countries the fit of the synthetic to the actual before 2010 is much worse than in the case of Tunisia. Consequently, we look at a normalized ratio, where we divide, for each placebo that exhibited a negative difference after 2010, the root mean square post-2010 difference by the corresponding root mean square pre-2010 difference.³⁹ The higher this normalized ratio is, the larger is the negative impact of a shock after 2010 relative to the pre-2010 average. Table A2.5 shows that Tunisia had an estimated normalized ratio of 8.46 which is the second highest among all the 115 countries and is only surpassed by Antigua and Barbuda which recorded a ratio of 8.52. According to the IMF (2012), Antigua and Barbuda's economy contracted by 5.5 percent in 2011 as a result of the 2007-08 financial crisis. Hence, our baseline results are unlikely to have been driven by factors other than the Jasmine revolution.

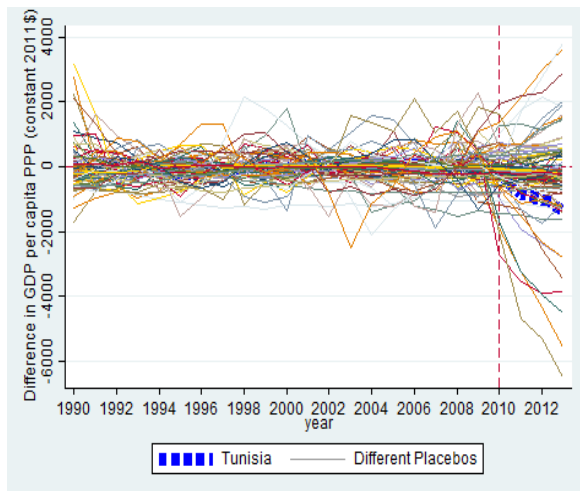
³⁹ The difference for country i during $s = 1, \dots, T$ is the Root Mean Squared Error (RMSE) calculated as $\sqrt{\frac{1}{T} \sum_{s=t}^T (y_s^i - y_s^{synth})^2}$.

In addition, we use another simple, yet novel, method to test the statistical significance of our results. In particular, we calculate

$$y_t = \frac{\text{Actual GDP per Capita}_t}{\text{Synthetic GDP per Capita}_t} \quad \text{for } t = 1990, \dots, 2013 \quad (2.5)$$

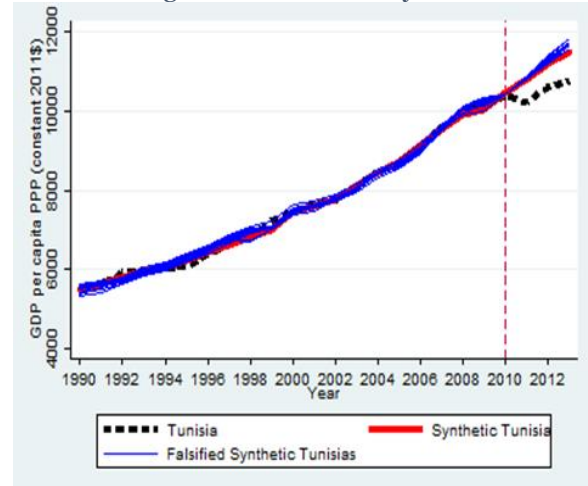
for Tunisia and each of the 114 control countries, and then regress this variable on a constant and a dummy variable called AS_t that takes the value 1 for 2011, 2012 and 2013 and 0 otherwise. In each of the 115 individual regressions, we are interested in the magnitude and sign of the t-statistic corresponding to the AS_t dummy. The statistical significance of this dummy variable is a test of whether a country was subject to a significant shock to its per capita GDP, relative to its synthetic counterpart, in the period 2011–2013. In particular, largely negative t-statistics suggest that events that occurred between 2011 and 2013 had significantly negative effects on the respective economies. The results reported in Table A2.6 show that, with the exception of Spain, the Tunisian version of regression (2.5) yielded the largest negative t-statistic on the AS_t dummy (−8.7), confirming the salience of our results.

Figure 2.11: Placebo tests



Source: Author's own calculations.

Figure 2.12: Distribution of Synthetic Tunisia after omitting one control country



Source: Author's own calculations.

2.6 Robustness Checks

In this section we conduct several robustness checks to assess the effectiveness of our baseline results. We start by testing whether the GDP per capita of the constructed synthetic Tunisia

is not driven by one country only. To do so, we adopt the following procedure. First, we restrict our sample to all the control countries that were assigned a non-zero weight in the baseline synthetic Tunisia.⁴⁰ Second, we construct several synthetic TunisiAs by omitting these countries, one at a time, while keeping the others in our set of controls. As noted by Abadie et al. (2015), the intuition is to check if the results are sensitive to the omission of any particular country. Figure 2.12 illustrates this sensitivity analysis and shows that excluding any of these control countries does not alter the path of the baseline synthetic Tunisia after 2010, meaning that our results are fairly robust as they are not driven by one particular country.

Another falsification (or fake) test that can be used to determine the reliability of our results is the “time series placebo”. In this test, we replicate the synthetic control analysis for a year earlier than 2011 in which the Tunisian economy did not actually experience any structural break (or shock) and ask the following question: do we observe a significant drop in the actual Tunisian per capita GDP compared to its synthetic counterpart after this fictitious treatment? If the answer to this question is “yes”, this means that our estimated results found earlier (in Figure 2.10) may have been driven by factors other than the Arab Spring itself. In contrast, a “no” answer supports our conclusion that the Arab Spring caused the observed slowdown in the Tunisian economy during the period 2011-2013. Specifically, we replicate the same SCM procedure followed above by developing a synthetic Tunisia using, instead of 1990 to 2010, the period 1990 to 2000 as a pre-shock period. In fact, we chose 2000 to be the end point given that Tunisia was not exposed to any structural shock in the early 2000s. As illustrated in Figure A2.3 in the appendix, we find that Tunisia’s per capita GDP did not drop relative to its synthetic counterpart in the aftermath of 2000.

⁴⁰ The control countries with non-zero weights are presented in Table A2.4 of the appendix.

However, given the high dependence of Tunisia’s economy on economic activity in the Euro area, one might argue that the sluggish economic activity in Tunisia after 2011 was driven by weaker demand from the Euro-area (see section 2.2.2). In order to test for that, we replicate the SCM analysis for 2008, the year when the Euro area witnessed a sharp deceleration in its economic activity as a result of the 2007-08 financial crisis. We notice from Figure A2.4 in the appendix that the Tunisian GDP per capita was almost unchanged relative to its synthetic counterpart (synthetic Tunisia 2008) in the aftermath of the financial crisis that brought havoc to economies in the Euro area. This confirms our main finding that the observed drop in per capita GDP after 2011 was primarily caused by the Arab Spring rather than the deceleration in the Euro economy.

Furthermore, we conduct two additional tests. First, we remove the Republic of Congo, Poland and Sri-Lanka from our pool of potential controls as these countries experienced major shocks in the run-up to the Arab Spring, possibly affecting the structure of the synthetic Tunisia. In particular, Poland accessed the EU in 2004, while the Republic of Congo and Sri-Lanka were both ravaged by armed conflicts during the last two decades. Second, using five-year averages for GDP per capita may mask different underlying trends between the control countries and Tunisia. To address this, we shorten our time span for the real GDP per capita covariate and consider three-year period averages instead of five. Figure A2.5 in the appendix plots the GDP per capita for (i) actual Tunisia (dotted blue line), (ii) baseline synthetic Tunisia (straight red line), (iii) synthetic Tunisia after omitting the three countries (dashed green line), and (iv) synthetic Tunisia after taking a three-year period average (straight black line).⁴¹

⁴¹ The covariate averages of the synthetic TunisiAs developed using test 1 and 2 are reported, along with the weights assigned to each control country composing the respective counterfactual, in Table A2.7 and Table A2.8 in the appendix, respectively. Note that with the first test, Angola, and Malaysia, have replaced the Republic of Congo, Poland and Sri Lanka as control countries. However, India, Mauritius and Belize

The results illustrate that in the first test, the GDP per capita of the synthetic Tunisia follows closely its baseline counterpart, even though its level is slightly lower since 2009 (i.e prior to the Arab Spring) likely reflecting the fact that Tunisia was not severely hit by the 2007-08 financial crisis in contrast to the other control countries. Meanwhile, the black line, representing the synthetic Tunisia of the second test, has approximately the same level before and after 2011, implying that our baseline results were not affected by different trends.

Another robustness check is to use a different methodology in order to quantify the impact of the Arab Spring (AS) on Tunisia's GDP per capita. In particular, we estimate the following Autoregressive Distributed Lag model (ADRL (1)):

$$\Delta \log(\text{Tunisia}_t) = c + \beta_1 \cdot \Delta \log(\text{World}_t) + \beta_2 \cdot \Delta \log(\text{Tunisia}_{t-1}) + \beta_3 \cdot \Delta \log(\text{World}_{t-1}) + \gamma'[\mathbf{AS}] + \mu_t \quad (2.6)$$

where $\Delta \log(\text{Tunisia}_t)$ is the log difference of Tunisia's GDP per capita and $[\mathbf{AS}]$ is a (3×1) vector of individual time dummies for 2011, 2012 and 2013 that take the value 1 for the corresponding year and 0 otherwise. To capture the impact of changes in the global economy on the Tunisian economy, we added to our model $\Delta \log(\text{World}_t)$ which denotes the log difference of the World's GDP per capita. Since the difference of Tunisia's GDP per capita is a generated variable, we bootstrap our standard errors with 1000 replications.⁴² The per capita GDP data for both Tunisia and the World, which run from 1990 to 2013,⁴³ were downloaded from the WDI database. In equation (2.6) the coefficients of interest are those in vector γ which capture the impact of the Arab Spring on Tunisia's per capita GDP growth in

which formed the core of the baseline synthetic Tunisia were assigned even higher weights, meaning that the composition of the baseline synthetic was not particularly changed.

⁴² We should note that only 278 replications were successful. This is likely due to the fact that we had three 1-year dummies. In particular, it is highly likely, that at any random draw, at least two of the three individual dummies will only be composed of 0 observation, hence leading to perfect multicollinearity. For additional testing, we also employed the jackknife resampling technique. As reported in Table A2.9 in the appendix, the magnitudes and statistical significance of the estimated coefficients remained unchanged.

⁴³ GDP per capita (in PPP terms) for Tunisia and the World is only available since 1990.

each year following the uprisings. The estimation results, presented in Table 2.4 (below), show that the coefficients of the year dummies for 2011 and 2013 are negative and statistically significant at the 5 percent level. In terms of magnitude, growth of GDP per capita (in PPP terms) dropped by 5.8 and 1.8 percentage points in 2011 and 2013, respectively. This compares to a 5.2 and 1.4 percentage point drop in 2011 and 2013 when using the Synthetic Control Method.⁴⁴ Overall, the SCM and regression results corroborate each other, because they suggest that the major impact of the Arab Spring on the Tunisian economy happened in 2011, but this impact is carried forward in 2012 and even amplified in 2013, as the Tunisian economy did not catch up with its synthetic counterpart (as evident by the SCM results).

⁴⁴ The 5.2 percentage point estimate for 2011 is calculated as the difference between the GDP per capita growth rate of actual Tunisia in 2011 (-1.7 percent) and that of its synthetic counterpart calculated (3.5 percent) estimated using the SCM method. For 2013, the GDP per capita growth rate of actual Tunisia was 1.4 percent compared to 2.9 for its synthetic counterpart.

Table 2.4: ADRL(1) with Bootstrapped Standard Errors

	(1)
D.log(World _t)	0.258 (0.204)
D.log(Tunisia _{t-1})	-0.084 (0.321)
D.log(World _{t-1})	0.297 (0.305)
AS(2011)	-0.058*** (0.009)
AS(2012)	-0.003 (0.019)
AS(2013)	-0.018*** (0.004)
Constant	0.024 (0.015)
Observations	24
R-squared	0.455

Bootstrapped standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Note: AS(2011) is a dummy variable that takes 1 for 2011 and 0 otherwise. AS(2012) is a dummy variable that takes 1 for 2012 and 0 otherwise. AS(2013) is a dummy variable that takes 1 for 2013 and 0 otherwise.

Finally, there is the issue of the high level of oil prices after 2010, compared to previous years. Oil price fluctuations have opposite effects on net exporters and net importers of oil. Although Tunisia's net oil exports are small, the same might not be true of synthetic Tunisia, as we have not used this as a criterion for choosing the weights. Indeed, synthetic Tunisia is a weighted average of some countries that have considerable oil imports and two (Republic of Congo and Trinidad and Tobago) that are major oil exporters, as can be seen from the data presented in Table A2.10 in the appendix, but in fact the weighted average is not too different from that of actual Tunisia.⁴⁵ For example, net fuel exports for Tunisia in 2010 were -1.1

⁴⁵ As can be seen from reported in Table A2.10, net fuel exports data are not available for each country and year. For instance, it is missing for 14 out of 21 years for the Republic of Congo. In a general context, the SCM algorithm overcomes this data problem by taking the average of any non-missing values during

percent of GDP compared to 1.6 percent for its synthetic counterpart.⁴⁶ Therefore, there was a 2.7 percentage point (pp) difference even before the uprisings occurred. Repeating this same exercise for the years following the Arab Spring, we observe that this difference initially increased to 4.7 pp in 2011 and then dropped back to 3.8 and 3.3 pp in 2012 and 2013, respectively.

It is also a useful robustness test to run the baseline SCM after adding net fuel exports as a share of GDP to our initial set of covariates. Because of the importance of the mining sector in the Tunisian economy (which accounted for 9.2 percent of total exported goods in 2010), we also include ores and metal exports (as a ratio of GDP) as a covariate.⁴⁷ Table A2.11 reports the covariate averages of actual Tunisia and its synthetic counterpart after adding these two variables, along with the corresponding weights assigned to each control country.⁴⁸ We notice that the set of control countries composing the new synthetic Tunisia has slightly changed relative to the baseline. One major reason for that is data limitation, as eleven countries, including Uzbekistan which had a 3.5 percent weight in the baseline synthetic, had to be omitted from the initial set of 114 controls because of the lack of data on net fuel exports.

the pre-intervention period. In our specific example, the corresponding average for net fuel exports between the period 1990-2000 will be the average values between 1993 and 1995, which equals 46.46 percent. While this is not perfect, it allows us to avoid losing valuable data and maximize our sample size (Billmeier and Nannicini, 2013).

⁴⁶ The 1.6 percent representing net fuel exports (as a ratio of GDP) of synthetic Tunisia in 2010 was calculated as follows. We multiplied the net fuel exports data for each of the 14 countries reported in Table A2.10 of the appendix (except for Uzbekistan and Trinidad and Tobago which did not have completed net fuel exports data between 2010 and 2013) by their respective weights from Table A2.4 and then summed them up.

⁴⁷ The definition and source of the net fuel exports and exports of ores and metals can be found in Table A2.3 in the appendix.

⁴⁸ We denote net fuel exports (as % of GDP) and ores and metal exports (as a % of GDP) by *nfx* and *omx*, respectively.

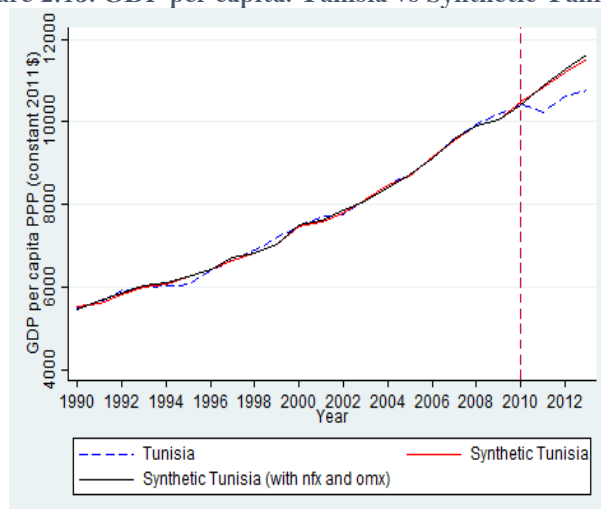
This change also reflects the fact that it was suboptimal to closely match the two additional covariates using the initial set of fourteen countries.

However, none of the newly added countries (Guinea-Bissau, Grenada, Malaysia and Zimbabwe) receive a weight greater than 1.5 percent. Furthermore, countries which were originally assigned a weight greater than 10 percent in the baseline specification (India, Sri Lanka, Mauritius and Belize) still account for a total of 60.8 percent of the newly constructed synthetic Tunisia. These two observations suggest that the core structure of the baseline synthetic Tunisia was not significantly altered by the inclusion of the two variables mentioned above. Consequently, we do not expect a major change to our baseline findings regarding the impact of the Arab Spring on the Tunisian economy. Indeed, Figure 2.13 (below) shows that, even after adding these two variables, the path of synthetic Tunisia's GDP per capita (black straight line) is roughly the same compared to the baseline (red straight line), indicating that our baseline results are robust to changing our set of covariates.

It is important to recognize the limitations of the SCM approach. Ideally, we need a longer pre-Arab Spring period than we actually have in order to reduce any possible omitted variable bias. Unfortunately, we could not do this because the earliest observation for our outcome variable (GDP per capita in PPP terms) is 1990. More fundamentally, the SCM depends on the right criteria being used to match the synthetic with the actual. Features of a country that are not easily quantifiable, such as trade and labour market regulations, tax systems and the relationship between business and the state, cannot easily be included. It also depends on the weighted average being an adequate measure of similarity, which would not be the case if the effects of a variable (oil prices, say) are asymmetric between oil importers and oil exporters. Non-linearities may also be a problem, since the fuel trade balance of major oil exporters is much further from zero than that of any oil importer. Finally, the SCM does not control for

idiosyncratic shocks that may have impacted Tunisia or any control country differently after 2011.

Figure 2.13: GDP per capita: Tunisia vs Synthetic Tunisia



Source: Author's own calculations. Note: Synthetic Tunisia (with nfx and omx) represents the baseline synthetic Tunisia after adding to the baseline the following variables (i) net fuel exports (% of GDP) and (ii) ores and metal exports (% of GDP).

2.7 The Main Channel of the Impact

Given the substantial negative impact of the Arab Spring on the Tunisian economy, the question arises as to what was the main channel through which the impact occurred? To answer this question, we employ the SCM methodology used above for each GDP component: Gross Capital Formation (CGF or Investment), Consumption and Net Exports; all measured as a percentage of GDP.

We first start by constructing a counterfactual for CGF between 1996 and 2010.⁴⁹ Our set of covariates includes Foreign Direct Investment (FDI) and Broad Money as a ratio of GDP with the latter being a proxy for monetary policy which impacts investment. In addition, the long and protracted period of transition from an autocratic to a democratic regime created uncertainty about the future political and economic agendas (K. Pfeifer, 2015) and as a result

⁴⁹ The starting period is 1996 and not 1990 because the rule of law estimate which we use as one of the characteristics to investment is only available since 1996.

investors' risk appetite may have been impacted. To account for this increase in uncertainty, which is argued to negatively impact investment,⁵⁰ we incorporate into our set of characteristics the Rule of Law Estimate⁵¹ taken from the Worldwide Governance Indicators database (WGI) published by the World Bank.⁵² Regarding consumption, our set of covariates is composed of (i) remittances, which are found by Chami et al. (2008) to increase the consumption of domestic households, (ii) tax revenues, which can be used as a proxy for domestic consumption, and (iii) government expenses for providing goods and services which control for current government spending. Finally, and in order to create the synthetic counterpart of the Tunisian trade balance, we use the real effective exchange rate in addition to ores and metal exports and net fuel exports as covariates.

As illustrated in Figure 2.14(a), consumption (as a ratio of GDP) for Tunisia surged above the value for its synthetic counterpart after 2011.⁵³ As discussed in section 2.2.3, this increase was driven by a dramatic rise in government spending as a result the fiscal expansion program adopted by the government in the aftermath of the uprisings that aimed at mitigating the adverse impact of the revolution on its citizens and address their demands. On the other hand, when looking at investment (GCF) in Figure 2.14(b), we observe an opposite pattern with Tunisia's actual investment (as a percentage of GDP) plummeting compared to its constructed counterfactual since 2011, implying that investment in Tunisia was adversely

⁵⁰ Several scholars have argued that investment is negatively associated with uncertainty as it induces firms to postpone investment decisions (Alesina and Perotti, 1996; Bernanke, 1983; Bloom, 2007; Dixit and Pindyck, 1993; Julio and Yook, 2012).

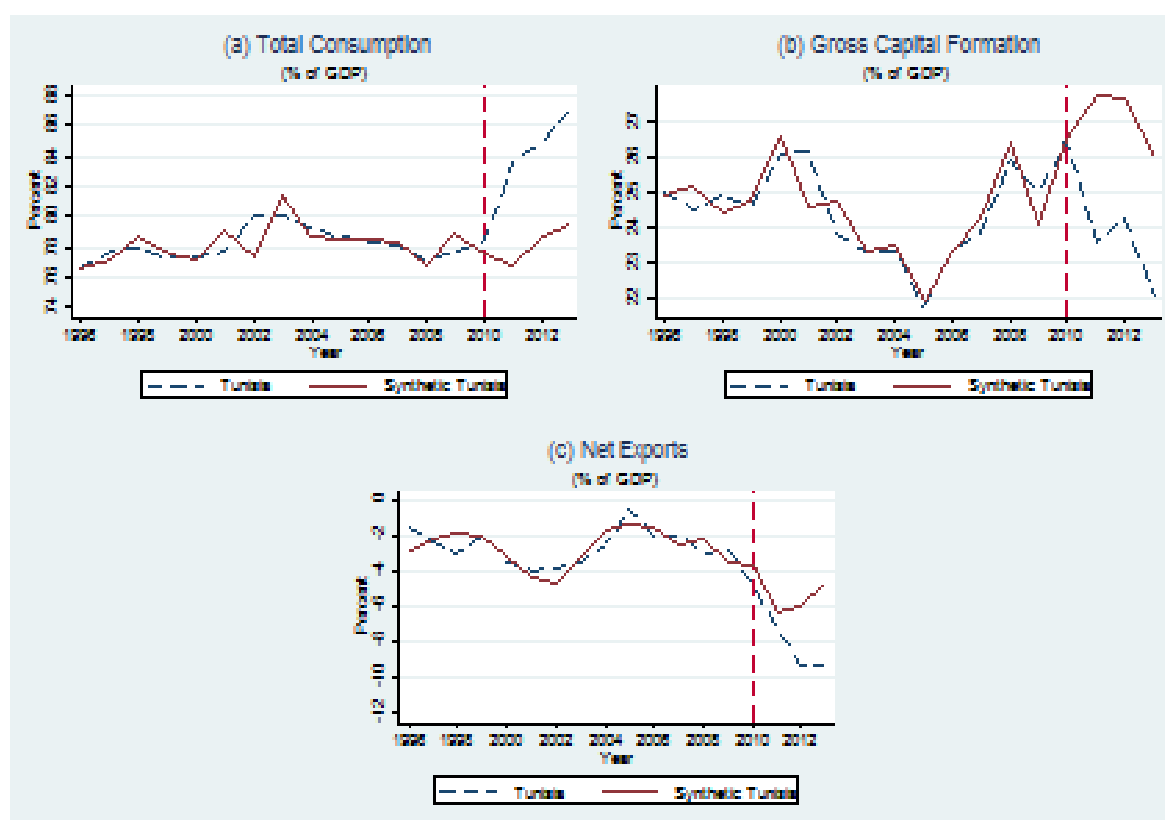
⁵¹ Table A2.3 in the appendix provides the definition and source of each variable used.

⁵² As a robustness test, we replaced the Rule of Law Index by the Government Stability component of the ICRG index as a measure of political instability. The results, presented in Figure A2.6 in the appendix confirm the robustness of our finding.

⁵³ For each variable in Figure 2.14 the dotted blue and straight red lines represent Tunisia and synthetic Tunisia, respectively.

and heavily impacted by the Arab Spring. In parallel, Figure 2.14(c) indicates that the actual trade balance deteriorated faster than its counterfactual without the Arab Spring. More specifically, Tunisia's investment (net exports) as a ratio of GDP was lower than that of its synthetic counterpart by an estimated 3.9 (2.6) percentage points on average between 2011 and 2013. As can be seen in Table A2.12 and Table A2.13 in the appendix, Tunisia had the second and first highest post-to-pre Arab Spring normalized ratio for investment and net exports, respectively, suggesting that the declines in these variables are unlikely to have been driven by issues other than the Arab Spring itself.

Figure 2.14: Components of GDP: Tunisia vs Synthetic Tunisia



Source: Author's own calculations.

Overall, the results suggest that investment was the major channel through which the Arab Spring impacted the Tunisian economy, most likely due to the increased uncertainty as a result of the unprecedented increase in the number of protests and riots in the country.⁵⁴

⁵⁴ See Figure 3.2 in chapter 3.

This has led to fears of even greater conflict, such as that which engulfed neighbouring Libya. Moreover, even if a worsening conflict could have been avoided, there were policy uncertainties associated with the political deadlock between secularist and Islamic political leaders, some of whom wished to follow an Islamic economic model similar to the one attempted by the Muslim Brotherhood in Egypt. Consequently, there was a succession of five governments between 2011 and 2013 and the drafting of a new constitution. Of course, we cannot conclusively establish that uncertainty was the most important factor that drove down investment. For instance, the large drop in investment might have stemmed from a credit crunch similar to the one that inhibited OECD economies after the 2008 global financial crisis. However, as noted at the beginning of section 2.2.3 above, the Tunisian Central Bank adopted an expansionary monetary policy aimed at boosting economic growth. Moreover, the Tunisian banking system is dominated by three large state owned banks that were bailed out and encouraged to keep lending. Finally, Tunisian firms surveyed in the 2013 World Bank Enterprise Survey have cited political instability ahead of access to finance as the main constraint to their growth, a verdict supported by our micro-econometric analysis in chapter 3.

2.8 Conclusion

This chapter estimates the effect of the Arab Spring on the Tunisian macro-economy from 2011 to 2013. To overcome the data limitation problems, we use the Synthetic Control Method, to construct synthetic Tunisia (a weighted average of other countries selected to have a strong resemblance to Tunisia over the period 1990-2010) as an estimate of actual Tunisia in the absence of the Arab Spring.

In sum, the results of this chapter suggest that the Arab Spring had a negative effect on the aggregate economy with an estimated per capita reduction in output of US\$ 600 (5.5 percent of GDP per capita) in 2011, US\$ 574 (5.1 percent of GDP per capita) in 2012 and

US\$ 735 (6.4 percent of GDP per capita) in 2013. In addition to placebo tests which confirm the significance of our results, we perform various additional empirical checks. We find that the path of the baseline synthetic Tunisia is not sensitive to: (i) excluding any of the control countries with non-zero weights, (ii) using different covariates, and (iii) performing time series falsification tests, whereby we apply the SCM methodology at earlier dates than 2010 when Tunisia did not experience a shock (2000 and 2008). Finally, the SCM results, which suggest that most of the impact of the Arab Spring occurred in the first year, with limited further losses (but also no recovery) in the third year, corroborate with those from regression analyses. Overall, our results are consistent with the literature on the growth dividends associated with regime changes, which finds a drop in growth rates during the early years of a political transition (Flores and Nooruddin, 2009; Freund and Jaud, 2014). We also find that investment was the main channel through which the economy was adversely impacted.

Nevertheless, it is important also to recognize the limitations of the methodology, the most important of which is the assumption that the weighted average of any variable is a sufficient statistic to guarantee the similarity of Synthetic and actual Tunisia in any period. Because the countries that make up synthetic Tunisia are a mixture of ones with higher and ones with lower values of any variable than actual Tunisia, this may be an invalid assumption if the effects of these differences are non-linear or asymmetric, as we have discussed above in relation to oil prices.

This chapter draws a broad picture of the impact of the Arab Spring on Tunisia's economy. However, it does not quantify the possible political and social benefits that Tunisians might have gained from moving from an autocratic to a democratic regime.⁵⁵ Moreover, the post-

⁵⁵ Acemoglu and Robinson (2012) argued that democracy leads to more inclusive political institutions, while Boix (2003) and Niskanen (1997) suggested that democracies redistribute income more equally and

shock period is too short to assess the long-run impact of Arab Spring on the Tunisian economy. Whether, and at what pace, the Tunisian economy might catch up with its synthetic counterpart in the long-run will depend in part on the state's ability to protect the interests of investors and tourists. Recent hostilities by the Islamic State (IS) and the havoc it is bringing to many Arab countries, especially Libya, one of the main trading partners with Tunisia, might worsen the already weakened economy.

The analysis undertaken in this chapter suggests several avenues for further empirical research. In particular, it would be valuable to examine the implications of the Arab Spring from a micro perspective. For example, research is needed to understand how micro agents (firms and households) were affected by the uprisings and whether the impact was heterogeneous across different groups. It would also be interesting to examine what impact the Arab Spring had on headcount poverty, inequality and females and youth incomes. This line of research could help policy makers develop better tools to alleviate the negative impact of revolutions.

produce more public goods. Finally, Baum and Lake (2003) found evidence that democracy increases the life expectancy in relatively poor countries.

Appendix for Chapter 2

Table A2.1: List of Omitted Countries

Country	Exogenous Shock After 2010
Algeria	Indirectly impacted by the Arab Spring since 2011
Bahamas /1	Impacted by several storms in 2012 and 2013
Bahrain	Directly impacted by the Arab Spring since 2011
Barbados	Impacted by tropical storm Chantal in 2013
Central African Republic /2	Impacted by a coup d'état in 2013
China /3	Hit by several earthquakes between 2011 and 2015
Cuba	Relations between the US and Cuba have been restored after 54 years of anomisity
Cyprus	Agreed a 10 billion Euro bailout package to avoid bankruptcy in 2013
Dominica /4	Hit by hurricane Ophelia in 2011
Egypt, Arab Republic	Directly impacted by the Arab Spring since 2011
Gambia/5	The agriculture sector was severely impacted as a result of the severe drought in 2011
Greece	Agreed two bailout packages in 2012 and 2015 worth 130 and 86 billion Euros, respectively to avoid bankruptcy
Honduras	Honduras was affected by the tropical storm Ernesto in 2012
Iraq	Subject to multiple security shocks
Islamic Republic of Iran	Impacted by the sanctions imposed since 2012 on the energy and financial sectors
Japan /6	Hit by the Fukushima Daiichi nuclear disaster in 2011
Jordan	Indirectly impacted by the Arab Spring since 2011
Lebanon	Indirectly impacted by the Arab Spring since 2011
Mali/7	Impacted by a coup d'état in 2012
Morocco	Indirectly impacted by the Arab Spring since 2011
Nepal /8	Hit by two severe eathquakes in 2015
Philippines /9	Hit by Typhoon Haiyan (Yolanda) in 2013
Russian Federation /10	Negatively impacted by economic sanctions in 2014
St. Lucia /11	Hit by a severe storm in December 2013
St. Vincent and the Grenadines /12	Hit by a severe storm in April 2011
Sudan	In 2011 Sudan was divided into two states: Sudan and South Sudan
St. Kitts and Nevis /13	Hit by intense floodings
Swaziland /14	Experienced a severe fiscal crisis
Thailand /15	Hit by unprecedented floods in 2011
Ukraine /16	Impacted by the internal conflict that started in November 2013 and then evloved into an internal war in 2014
Yemen Republic	Directly impacted by the Arab Spring since 2011
Vanuatu /17	Hit by Tropical Cyclone Pam in 2015

/1 http://www.huffingtonpost.com/2012/10/26/hurricane-sandy-2012-baha_n_2022420.html

/2 <http://www.worldbank.org/en/country/centralafricanrepublic/overview>

/3 <http://www.theguardian.com/world/2014/aug/03/earthquake-kills-southern-china-yunnan>

<http://www.theguardian.com/world/2014/aug/03/earthquake-kills-southern-china-yunnan>
<http://www.news.com.au/world/magnitude61-earthquake-hits-chinas-yunnan-province-at-least-367-dead/story-fndir2ev-1227012167142>

/4 <https://www.imf.org/external/pubs/ft/scr/2012/cr1247.pdf>

/5 http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/2014/PDF/CN_Long_EN/Gambie_EN.pdf

/6 <http://www.bbc.co.uk/news/business-13045328>

/7 <https://www.imf.org/external/np/sec/pr/2012/pr12437.htm>

/8 <http://www.worldbank.org/en/news/press-release/2015/06/29/world-bank-approves-300-million-for-nepal-earthquake-recovery>

/9 <http://www.worldbank.org/en/news/press-release/2013/11/18/world-bank-group-supporting-philippines-typhoon-reconstruction-with-500-million-financial-package>

/10 <https://www.imf.org/external/pubs/ft/scr/2015/cr15211.pdf>

/11 http://www-wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2014/02/03/000442464_20140203124432/Rendered/PDF/843290WPOSVG0R0Box0382136B00PUBLIC0.pdf

/12 <http://www.imf.org/external/pubs/ft/scr/2011/cr11344.pdf>

/13 <http://www.ccmf-uwu.org/files/publications/newsletter/Vol7No04.pdf>

/14 <http://www.imf.org/external/pubs/ft/scr/2012/cr1237.pdf>

/15 <http://www.worldbank.org/en/news/feature/2011/12/13/world-bank-supports-thailands-post-floods-recovery-effort>

/16 <http://www.bbc.co.uk/news/world-middle-east-26248275>; <http://www.economist.com/news/europe/21591217-has-ukrainians-defiance-presidents-european-policy-split-country-new-revolution>

/17 <http://www.worldbank.org/en/news/press-release/2015/03/30/world-bank-group-offers-support-to-aid-vanuatu-recove>

Table A2.2: Average of Each Covariate by Country pre-2011

Country	GCF (% of GDP) 1990-2000	GCF (% of GDP) 2001-2010	Consumption (% of GDP) 1990-2000	Consumption (% of GDP) 2001-2010	Imports (% of GDP) 1990-2000	Imports (% of GDP) 2001-2010	Exports (% of GDP) 1990-2000	Exports (% of GDP) 2001-2010	GDP (US\$) 1990-1999	GDP (US\$) 1993-1999	GDP (US\$) 2000-2004	GDP (US\$) 2005-2010	Agriculture (% of GDP) 1990-2000	Agriculture (% of GDP) 2001-2010	Services (% of GDP) 1990-2000	Services (% of GDP) 2001-2010	Life Expectancy at birth (year)	Secondary School Enrollment (%)
Albania	17.1	27.8	110.9	93.9	41.0	48.8	13.0	23	3,387	4,304	5,979	8236.7	40.8	22.6	34.3	38.9	74.2	71.8
Angola	18.2	13.0	79.7	68.4	63.0	53.3	63.1	72	3,208	2,938	3,413	5806.2	12.4	8.7	29.9	27.7	43.4	17.9
Antigua and Barbuda	36.0	29.9	68.0	84.2	83.6	65.4	79.5	51	17,379	18,089	19,269	23335.1	3.8	1.9	77.5	79.3	73.3	104.4
Armenia	21.4	30.3	105.7	89.6	37.4	43.9	30.2	24	2,573	2,463	3,720	6409.7	33.6	22.1	29.7	37.1	71.1	92.2
Australia	23.2	26.9	73.7	74.6	18.8	21.2	17.9	20	28,387	32,190	36,449	40431.9	3.6	3.1	67.7	69.9	79.4	142.9
Austria	26.3	24.0	74.2	72.9	36.3	43.0	33.8	46	31,929	35,241	39,321	42332.2	2.5	1.6	65.2	68.2	78.1	101.2
Azerbaijan	21.2	31.5	87.2	53.4	47.9	41.3	39.5	54	6,339	3,997	5,397	12932.6	23.7	10.0	37.8	30.0	67.0	89.0
Belarus	28.4	31.1	75.8	73.0	60.9	66.9	36.8	61	7,133	6,063	8,333	13430.7	17.6	10.4	41.0	48.1	69.2	96.6
Belgium	22.7	23.1	74.3	73.4	38.7	69.8	61.5	73	31,378	34,314	38,126	40791.3	1.4	1.0	70.0	73.8	78.0	123.8
Belize	24.4	20.6	81.0	86.6	37.6	62.9	32.2	56	5,944	6,170	7,379	7906.0	17.6	14.6	61.3	63.3	71.2	73.8
Benin	17.2	20.2	89.9	88.6	32.2	28.3	23.2	20	1,368	1,446	1,573	1619.4	34.7	34.7	32.3	31.2	33.8	23.8
Bhutan	40.4	32.0	72.7	63.1	43.3	36.4	32.2	39	2,481	3,189	4,011	5473.3	31.7	22.2	37.0	37.0	60.1	44.7
Bolivia	17.0	13.0	90.3	82.1	27.9	31.0	20.6	34	3,848	4,293	4,437	5061.8	16.2	14.2	31.9	32.4	62.8	79.0
Botswana	29.4	31.7	62.4	62.5	43.9	42.0	32.1	46	8,379	9,331	10,712	12631.3	4.2	2.7	44.3	33.9	32.4	66.3
Brunei Darussalam	27.3	14.6	63.4	46.2	49.3	32.5	38.4	72	77,333	76,110	76,238	74445.0	1.1	0.9	41.6	31.6	76.0	88.0
Bulgaria	15.8	27.2	83.1	83.0	43.4	36.3	44.5	44	8,438	8,630	10,264	14160.2	14.9	8.2	32.7	63.1	71.9	92.4
Burkina Faso	22.3	21.8	91.4	92.2	24.6	23.2	11.0	11	849	969	1,110	1321.8	32.8	23.1	43.5	32.2	31.2	12.3
Burundi	8.6	17.5	103.4	106.7	22.8	31.3	8.8	7	1,015	761	703	697.5	30.9	43.2	30.8	39.8	48.7	11.6
Cameroon	14.9	18.5	81.4	83.1	17.4	22.3	21.1	21	2,423	2,283	2,478	2359.3	24.1	22.1	43.2	46.9	32.7	28.2
Chad	14.0	32.9	100.0	83.6	30.1	32.2	16.1	36	1,112	1,049	1,198	1781.3	37.2	46.3	49.3	37.1	47.2	13.5
Chile	23.0	22.0	74.3	72.0	28.4	31.6	29.1	38	10,632	14,068	13,342	18385.3	7.9	4.4	34.3	38.1	76.3	86.9
Colombia	19.5	20.5	82.1	82.2	18.4	19.1	16.8	16	7,780	8,437	8,328	10229.7	14.3	8.2	33.1	39.0	70.9	74.7
Comoros	17.4	13.2	104.9	109.8	39.5	38.7	17.2	16	1,306	1,381	1,433	1424.0	40.9	41.1	47.6	47.0	37.9	33.2
Congo, Dem. Rep.	7.7	11.9	91.3	92.7	21.0	31.0	22.0	27	977	647	306	363.4	43.3	23.3	33.4	41.8	47.2	32.3
Congo, Rep.	28.2	22.3	58.6	33.9	48.0	56.0	61.2	80	3,090	4,643	4,744	5193.9	10.0	4.9	42.1	23.1	33.9	46.1
Costa Rica	18.6	22.7	84.2	81.5	42.4	49.1	39.6	45	7,733	8,779	9,827	12019.6	12.3	8.3	37.0	63.0	77.6	63.7
Cote d'Ivoire	11.3	11.6	82.3	79.8	31.1	38.9	37.6	47	3,008	3,063	2,832	2712.0	27.1	24.1	50.1	33.2	48.7	24.3
Czech Republic	29.2	29.7	71.3	69.0	40.8	36.8	40.3	58	18,062	19,742	22,368	27703.5	4.0	2.4	37.3	60.4	74.7	91.9
Denmark	20.4	22.0	74.0	72.8	32.3	42.6	37.9	46	34,156	38,479	42,103	44246.4	3.0	1.6	71.0	72.7	76.7	119.8
Djibouti	10.9	20.0	106.4	92.6	39.8	34.0	42.3	41	2,718	2,170	2,124	2432.7	3.4	3.6	80.1	80.1	37.6	16.6
Dominican Republic	20.1	21.6	85.7	83.3	42.3	37.3	36.3	31	3,670	6,989	8,203	10188.1	10.4	7.0	35.4	62.9	70.6	63.9
Ecuador	21.3	23.3	79.0	78.6	23.3	28.8	22.9	27	7,394	7,740	7,737	9024.4	20.7	10.8	31.3	33.2	72.9	61.3
El Salvador	17.0	13.7	96.8	102.3	33.4	44.0	21.3	26	4,931	6,002	6,622	7393.5	14.3	10.8	36.2	39.7	69.5	33.4
Ethiopia	19.6	30.4	87.7	87.1	13.8	30.4	8.3	13	373	604	640	894.1	33.8	44.8	34.1	42.9	33.1	16.2
Fiji	18.0	21.1	83.3	90.8	60.7	66.3	39.1	33	3,744	6,233	6,743	7128.0	19.3	13.8	36.4	63.6	67.3	83.3
Finland	22.3	23.3	72.6	71.7	27.7	33.2	32.9	40	26,560	29,913	33,984	40139.0	4.4	2.7	62.3	63.9	77.6	116.8
France	21.2	22.3	77.3	78.0	21.9	26.7	23.2	26	29,837	32,038	33,332	36914.7	2.7	1.9	72.6	76.7	79.1	108.6
Gabon	23.6	24.3	53.0	47.5	36.0	28.2	33.4	56	19,213	19,762	17,204	16224.6	7.6	5.1	43.4	41.8	60.7	48.1
Georgia	19.3	27.9	102.0	91.5	30.3	30.3	29.2	31	4,463	2,823	3,763	5312.1	39.0	14.9	37.6	61.1	71.6	82.7
Germany	23.9	19.9	73.8	73.4	23.8	33.0	24.1	38	32,721	34,723	37,342	39792.2	1.1	0.9	66.1	69.6	77.7	99.4
Ghana	20.3	23.7	92.6	93.8	40.3	51.3	27.3	34	1,986	2,154	2,363	2813.3	42.3	33.5	32.8	40.3	38.0	43.0
Grenada	33.6	32.2	82.8	93.3	64.0	53.3	43.7	28	7,477	8,309	9,994	11646.7	9.8	3.3	69.9	74.3	70.4	103.9
Guinea	21.2	16.4	81.9	86.8	27.1	33.2	23.9	30	1,077	1,082	1,170	1192.8	20.3	24.0	49.3	38.4	32.1	19.8
Guinea-Bissau	24.0	3.6	99.3	103.1	37.3	29.9	14.0	19	1,331	1,319	1,238	1286.6	33.1	44.1	32.2	41.2	31.4	28.3
Guyana	33.3	24.2	81.0	94.2	113.4	108.3	101.0	92	3,763	4,937	5,221	5383.8	36.9	26.5	31.4	43.6	63.7	92.3
Hong Kong SAR, China	29.3	22.5	68.0	68.6	131.3	177.0	133.9	186	29,676	32,307	33,220	43085.8	0.1	0.1	87.3	91.2	80.3	80.3
Iceland	21.0	23.9	79.3	78.9	33.4	40.6	33.0	38	27,732	30,128	34,933	40434.3	9.2	6.7	62.8	68.1	80.0	106.8
India	23.9	32.6	77.0	70.3	10.9	21.4	10.0	19	1,832	2,246	2,714	3797.6	27.0	19.2	46.9	33.3	62.1	31.3
Indonesia	27.1	26.1	69.6	69.3	27.7	26.1	31.1	31	3,039	6,031	6,149	7631.7	17.7	14.4	40.2	39.7	67.1	37.7
Ireland	20.5	24.6	69.8	62.2	62.4	71.3	72.1	84	23,329	32,362	43,902	47103.1	4.4	1.6	62.0	63.8	77.2	109.7
Italy	20.1	21.1	77.6	79.1	19.7	23.2	21.9	25	31,269	33,733	36,613	36917.4	3.2	2.3	68.0	71.8	79.3	92.4
Kazakhstan	21.4	28.9	81.1	63.1	43.6	41.0	43.1	49	10,611	8,430	12,084	18012.0	14.0	7.0	31.0	32.8	66.3	97.0
Kenya	18.2	18.4	86.0	90.7	31.4	32.6	27.1	24	2,239	2,203	2,166	2399.9	30.9	27.0	31.4	33.4	33.8	47.2
Korea, Rep.	32.7	31.8	66.4	66.1	28.1	37.4	29.0	39	13,801	18,009	22,699	28024.2	3.9	3.1	36.2	39.8	73.9	97.6
Kyrgyz Republic	18.1	21.3	94.3	98.7	47.3	63.0	33.1	43	2,677	1,873	2,211	2634.2	40.3	30.9	31.9	43.2	67.8	88.4
Lao PDR	13.9	24.5	100.2	83.1	36.7	42.1	23.6	33	1,704	2,081	2,363	3431.3	33.3	37.7	23.6	37.9	61.2	33.9
Lesotho	61.8	27.7	144.3	143.8	131.7	123.2	23.6	54	1,379	1,337	1,703	1999.0	18.0	9.0	42.0	37.2	30.4	34.9

Source: World Development Indicators and author's own calculations

Table A2.2 (Continued): Average of Each Covariate by Country pre-2011

Country	GCF (% of GDP) 1990-2000	GCF (% of GDP) 2001-2010	Consumption (% of GDP) 1990-2000	Consumption (% of GDP) 2001-2010	Imports (% of GDP) 1990-2000	Imports (% of GDP) 2001-2010	Exports (% of GDP) 1990-2000	Exports (% of GDP) 2001-2010	GDP (US\$) 1990-1994	GDP (US\$) 1995-1999	GDP (US\$) 2000-2004	GDP (US\$) 2005-2010	Agriculture (% of GDP) 1990-2000	Agriculture (% of GDP) 2001-2010	Services (% of GDP) 1990-2000	Services (% of GDP) 2001-2010	Life Expectancy at birth (year)	Secondary School Enrollment (%)
Luxembourg	20.8	19.3	87.2	81.7	91.1	136.2	113.1	165.3	61,368	68,825	83,592	91,903	0.9	0.5	79.3	83.3	77.8	90.8
Macao SAR, China	25.2	21.3	48.6	42.3	64.1	62.8	90.3	99.2	40,437	41,839	46,671	79,040	0.0	0.0	83.5	86.1	77.6	88.9
Macedonia, FYR	19.0	22.0	90.4	96.3	46.0	53.0	36.6	34.6	8,596	7,992	8,665	10,378	12.9	12.0	53.4	64.1	73.1	79.5
Madagascar	12.6	24.4	95.5	92.2	29.2	43.0	21.1	26.3	1,509	1,402	1,351	1,435	28.6	25.1	59.0	56.2	57.5	24.9
Malawi	17.3	21.9	96.5	95.3	39.0	43.0	25.2	25.5	551	635	605	674	37.5	33.2	40.3	49.0	48.0	26.5
Malaysia	35.5	22.6	55.9	57.6	55.1	55.9	93.5	105.7	11,550	14,762	16,206	19,335	12.7	9.2	44.2	45.7	72.5	65.9
Malta	25.5	16.7	83.5	84.2	90.6	83.7	81.4	82.8	15,101	22,423	25,105	26,560	2.9	2.5	46.8	59.0	75.1	53.2
Mauritania	21.0	32.4	82.7	59.1	41.4	58.0	37.5	36.5	2,761	2,502	2,715	3,293	35.5	29.0	38.0	37.4	59.7	17.8
Mauritius	28.0	23.9	75.8	81.3	65.3	62.5	61.5	57.4	8,181	9,561	11,865	14,178	9.9	5.3	55.1	66.5	71.3	79.5
Mexico	20.9	22.4	79.7	79.1	21.5	25.0	20.9	26.5	13,062	13,604	14,619	15,434	5.1	3.5	62.9	61.7	74.1	65.5
Moldova	31.3	27.9	80.8	110.1	56.6	84.7	44.4	46.8	4,414	2,441	2,684	3,647	34.1	17.6	34.9	63.7	67.4	55.7
Mongolia	26.5	34.6	84.0	74.0	55.0	62.9	44.2	54.3	4,369	4,434	5,050	7,035	29.2	20.5	39.2	45.6	63.3	76.1
Mozambique	21.6	15.9	101.7	92.9	36.4	41.8	13.1	30.0	463	526	661	841	33.7	27.7	48.5	45.5	46.5	11.4
Namibia	19.4	22.6	86.2	84.2	49.3	52.9	43.7	46.2	5,931	5,960	6,425	7,940	10.0	10.0	63.7	58.1	58.4	56.9
Netherlands	22.8	21.3	71.5	71.1	53.0	55.8	55.7	66.4	33,377	37,586	41,980	45,352	3.4	2.0	69.8	74.4	75.4	124.2
New Zealand	21.5	23.2	76.4	75.7	27.9	29.5	30.1	30.7	23,571	26,512	29,571	32,113	7.1	6.3	65.7	68.7	75.3	111.7
Nicaragua	22.5	23.3	95.9	96.0	40.6	47.6	18.9	26.3	2,905	3,165	3,547	3,972	21.2	17.7	56.9	58.9	69.5	54.3
Niger	9.4	23.2	97.2	91.5	53.1	32.6	16.6	17.6	843	905	775	795	39.2	37.1	43.4	47.5	50.6	8.5
Nigeria	10.1	9.3	75.2	81.4	24.5	26.2	36.2	35.6	2,904	2,787	3,177	4,617	32.7	35.1	23.4	27.5	47.5	31.5
Norway	23.6	23.3	69.0	62.6	31.6	28.1	39.0	42.2	45,814	54,525	60,235	64,240	2.5	1.6	63.3	57.5	75.8	113.5
Oman	16.1	26.0	73.4	53.7	35.8	33.6	46.3	53.9	36,513	40,544	43,646	44,975	2.5	1.7	48.8	38.0	72.1	72.9
Pakistan	18.6	17.7	84.5	86.5	19.5	18.5	16.1	14.4	3,199	3,595	3,595	4,237	26.1	23.2	49.6	53.7	63.5	25.1
Panama	24.6	20.5	72.3	73.2	55.4	66.1	55.4	72.5	8,358	9,366	10,161	13,440	8.0	6.3	74.0	75.2	75.1	64.6
Papua New Guinea	21.5	21.0	71.9	67.9	47.0	55.8	53.6	67.0	1,940	2,082	1,755	1,960	32.7	35.6	31.1	23.2	58.9	12.7
Paraguay	20.1	16.1	73.7	73.7	47.2	44.1	53.3	54.3	6,142	6,577	5,970	6,620	17.7	19.3	46.7	46.5	70.1	54.1
Peru	19.0	20.1	84.3	76.5	17.3	21.0	14.0	24.2	5,367	6,359	6,756	8,741	9.3	7.5	59.3	55.5	70.1	79.7
Poland	20.5	21.0	80.5	81.6	24.6	37.5	23.6	35.2	9,551	12,504	15,219	19,324	4.2	3.2	60.4	64.7	73.5	96.6
Portugal	25.9	23.7	82.1	84.6	34.4	36.7	26.5	25.4	21,021	23,624	26,382	27,270	4.4	2.7	67.0	72.6	76.5	97.6
Puerto Rico	17.3	13.8	75.0	65.0	62.1	61.5	69.5	75.8	26,294	30,243	33,624	36,106	1.4	0.6	13.3	10.3	76.3	54.1
Romania	24.3	23.3	81.9	83.5	31.5	42.1	25.3	33.0	9,992	10,254	11,495	16,249	19.3	10.0	39.4	52.9	70.9	53.4
Rwanda	14.0	17.9	105.9	96.4	25.4	6.1	11.2	11.2	913	747	892	1,179	39.9	36.2	41.6	51.0	45.0	17.0
Saudi Arabia	20.0	23.7	71.6	54.0	29.1	29.1	37.5	51.4	36,743	35,400	35,153	41,531	5.7	3.5	45.2	38.2	72.4	94.8
Senegal	13.2	23.5	94.1	92.3	33.9	42.2	26.5	26.4	1,506	1,510	1,964	2,141	19.7	16.3	56.8	59.6	59.0	19.5
Seychelles	29.8	26.4	105.8	81.9	57.2	58.7	21.6	55.1	15,011	16,936	17,482	19,675	3.8	2.8	74.1	66.8	72.3	93.6
Sierra Leone	6.3	12.6	98.9	102.0	27.7	25.7	22.4	14.1	1,244	1,037	1,073	1,259	48.8	53.0	19.1	37.1	39.3	19.4
Solomon Islands	9.5	10.2	110.3	104.5	59.5	52.3	34.4	33.9	1,976	2,184	1,866	1,727	41.5	33.5	45.2	56.3	62.5	25.5
South Africa	17.2	19.0	80.1	80.3	20.7	28.6	23.4	29.3	9,547	9,929	10,245	11,539	4.1	3.1	61.2	66.2	56.5	86.6
Spain	23.8	25.0	78.0	75.5	23.4	25.9	21.6	25.4	24,631	27,335	31,805	33,876	4.4	3.1	65.0	67.5	79.2	113.7
Sri Lanka	25.2	25.4	83.9	83.2	43.2	38.9	34.2	30.2	3,603	4,376	5,192	6,702	23.3	13.4	50.2	57.5	71.5	77.5
Suriname	14.6	24.2	93.1	98.7	34.9	46.6	27.1	23.7	10,191	9,765	10,573	13,445	12.7	8.1	62.9	50.4	65.4	67.8
Sweden	22.1	22.6	73.4	70.9	30.9	35.8	35.4	45.3	30,016	32,757	35,193	42,533	2.6	1.6	67.2	69.0	79.6	120.5
Switzerland	26.7	24.2	69.4	67.4	39.5	47.3	43.7	55.7	43,343	45,942	49,292	53,453	1.6	0.9	69.3	72.3	79.5	96.5
Tajikistan	24.5	16.7	81.2	111.6	55.9	65.6	53.2	37.2	2,519	1,110	1,407	1,932	30.9	23.6	32.5	43.5	64.2	53.3
Tanzania	21.4	24.1	96.5	83.3	33.5	25.5	15.7	18.1	1,417	1,405	1,612	1,993	43.5	32.4	39.8	45.5	52.0	5.6
Togo	16.2	16.3	93.7	100.2	40.5	54.5	30.6	35.1	1,206	1,317	1,241	1,214	37.2	36.4	42.1	46.0	54.5	31.7
Tonga	21.1	23.4	111.3	114.2	53.3	53.3	20.9	15.7	3,847	4,316	4,832	4,945	29.2	20.3	52.9	59.5	70.5	104.7
Trinidad and Tobago	20.6	20.6	71.5	56.5	40.7	35.7	48.6	60.5	13,469	15,265	20,512	25,951	2.3	0.8	52.1	42.4	65.7	81.7
Turkey	23.2	15.9	79.7	83.4	21.5	25.7	15.5	23.5	10,918	12,399	13,005	16,041	15.2	10.0	52.3	62.1	69.7	73.5
Uganda	16.4	22.3	95.3	99.3	21.6	27.1	9.9	15.5	807	996	1,135	1,423	46.2	25.6	35.1	50.4	49.5	17.0
United Kingdom	19.4	18.1	81.1	84.5	25.5	25.5	25.0	26.3	26,576	29,513	34,185	37,025	1.3	0.7	69.5	76.3	77.9	99.4
United States	21.6	21.4	79.8	83.0	11.6	14.9	10.2	10.6	37,532	41,925	46,535	49,945	1.3	1.1	75.3	77.4	76.7	93.7
Uruguay	15.3	17.9	85.1	82.0	19.3	27.0	15.9	27.0	10,722	12,653	15,045	14,547	5.0	10.0	62.5	63.9	74.6	92.2
Uzbekistan	26.4	22.0	77.9	74.0	31.4	32.2	27.1	36.2	2,653	2,291	2,636	3,599	32.9	27.0	37.6	45.7	66.9	96.6
Venezuela, RB	20.9	24.1	72.7	65.2	22.7	20.0	29.2	30.5	15,361	15,092	15,561	16,659	5.1	4.6	45.0	43.4	72.6	65.1
Vietnam	23.9	34.2	83.2	74.1	45.5	69.9	35.7	61.6	1,679	2,306	2,942	3,955	29.6	19.9	41.1	42.5	73.3	45.5
Zambia	13.5	29.9	91.6	64.0	36.5	32.9	30.5	30.3	2,199	2,062	2,227	2,549	19.4	14.9	41.3	54.3	44.5	20.5
Zimbabwe	15.9	8.2	83.0	106.3	35.6	49.0	33.7	34.4	2,432	2,594	2,203	1,435	17.1	17.7	52.4	51.3	45.9	41.9
Tunisia	26.0	24.3	78.1	75.5	45.1	48.5	41.0	45.9	5,510	6,636	7,895	9,656	14.9	9.7	53.3	60.2	72.5	70.6
Average without Tunisia	21.5	22.6	83.4	81.3	41.7	46.3	36.7	42.3	12065.3	13093.5	14555.3	16741.5	15.9	14.7	51.3	55.0	66.1	67.2

Source: World Development Indicators and author's own calculations

Table A2.3: Data Variables and Sources

Covariate	Unit	Definition	Source
Consumption	% of GDP	Final consumption expenditure the sum of household final consumption expenditure and general government final consumption expenditure	WDI
GCF	% of GDP	Gross capital formation consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	WDI
Imports	% of GDP	Imports of goods and services represent the value of all goods and other market services received from the rest of the world.	WDI
Exports	% of GDP	Exports of goods and services represent the value of all goods and other market services provided to the rest of the world.	WDI
Agriculture	% of GDP	Value added of the agriculture sector which includes includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production.	WDI
Services	% of GDP	Value added of the services sector which includes wholesale and retail trade , transport, and government, financial, professional, and personal services , health care, and real estate services. Also included are imputed bank service charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling.	WDI
Life expectancy at birth	Years	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	
Secondary School Enrollement	%	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.	WDI
FDI	% of GDP	Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided	WDI
Broad Money	% of GDP	Broad money (IFS line 35L.ZK) is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.	WDI

Table A2.3 (Continued): Data Variables and Sources

Covariate	Unit	Definition	Source
Rule of Law Estimate	Score between -2.5 (worst) and 2.5 (best)	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	WGI
Fuel Exports	% of Merchandise Exports	Fuels comprise SITC section 3 (mineral fuels)	WDI
Fuel Imports	% of Merchandise Imports	Fuels comprise the commodities in SITC section 3 (mineral fuels)	WDI
Ores and Metals Exports	% of Merchandise Exports	Ores and metals comprise the commodities in SITC sections 27 (crude fertilizer, minerals nes); 28 (metalliferous ores, scrap); and 68 (non-ferrous metals)	WDI
Government Stability (ICRG)	Index	A measure of both of the government's ability to carry out its declared program(s), and its ability to stay in office. The risk rating assigned is the sum of three subcomponents: Government Unity, Legislative Strength, and Popular Support.	PRS
Personal remittances, received	% of GDP	Personal remittances comprise personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households. Personal transfers thus include all current transfers between resident and nonresident individuals. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by nonresident entities. Data are the sum of two items defined in the sixth edition of the IMF's Balance of Payments Manual: personal transfers and compensation of employees.	WDI
Tax Revenue	% of GDP	Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue.	WDI
Expense	% of GDP	Expense is cash payments for operating activities of the government in providing goods and services. It includes compensation of employees (such as wages and salaries), interest and subsidies, grants, social benefits, and other expenses such as rent and dividends.	WDI
Real effective exchange rate index (2010 = 100)	Index	Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs.	WDI

Table A2.4: Country Weights in the Synthetic Tunisia

Country	Weight (%)
Vietnam	0.3
Moldova	1.7
Lesotho	2.0
Trinidad and Tobago	2.0
Korea, Rep.	2.2
Panama	3.5
Uzbekistan	3.5
Peru	4.1
Poland	8.1
Congo, Rep.	8.7
Sri Lanka	10.3
India	16.4
Mauritius	17.5
Belize	19.7

Source: Author's own calculations.

Table A2.5: Normalized Ratio of Post-2010 gap to Pre-2010 gap*

Country	Normalized Ratio	Country	Normalized Ratio
Georgia	0.14	Grenada	1.71
Saudi Arabia	0.14	Fiji	1.76
Angola	0.15	Comoros	1.81
Dominican Republic	0.17	United Kingdom	1.84
Botswana	0.22	Togo	1.85
Ethiopia	0.25	Puerto Rico	1.88
Chile	0.27	Macedonia, FYR	1.89
Australia	0.36	Denmark	1.93
Moldova	0.36	Uganda	1.95
Korea, Rep.	0.51	Zambia	1.95
Sweden	0.53	Mauritania	2.36
Armenia	0.56	Guyana	2.36
Guinea-Bissau	0.56	Turkey	2.37
Poland	0.57	Tanzania	2.66
Tajikistan	0.57	Niger	2.67
United States	0.67	Burundi	2.78
Mozambique	0.67	Cameroon	2.91
Belize	0.69	Senegal	3.07
Tonga	0.72	Cote d'Ivoire	3.10
Costa Rica	0.77	Pakistan	3.59
Djibouti	0.87	Benin	3.76
New Zealand	0.88	Madagascar	3.76
Congo, Rep.	1.02	El Salvador	3.76
Chad	1.08	Paraguay	3.77
Nigeria	1.10	Bolivia	3.87
Lesotho	1.14	Suriname	4.05
Papua New Guinea	1.18	Guinea	4.10
Portugal	1.18	South Africa	4.31
Nicaragua	1.21	Namibia	5.00
Solomon Islands	1.21	Trinidad and Tobago	5.78
Kyrgyz Republic	1.31	Czech Republic	5.82
Congo, Dem. Rep.	1.34	Iceland	5.96
Venezuela, RB	1.37	Italy	6.32
Malawi	1.45	Romania	6.72
Finland	1.49	Bulgaria	7.25
Burkina Faso	1.56	Spain	8.42
Zimbabwe	1.59	Tunisia	8.46
Netherlands	1.64	Antigua and Barbuda	8.52

Source: Author's own calculations. Note: The normalized ratio for each country is calculated as the difference between the actual per capita GDP of each country and that of its synthetic counterpart after 2010 divided by the estimated difference before 2010. The higher this normalized ratio is, the larger is the negative impact of a shock after 2010.

* The normalized ratio is only calculated for control countries that exhibited a negative gap between actual and synthetic GDP per capita after 2010.

Table A2.6: t-statistic of the AS coefficient*

Country	t-statistic	Country	t-statistic
Ethiopia	6.00	Venezuela, RB	-1.90
Lesotho	1.77	Grenada	-1.95
Mozambique	1.31	Zambia	-1.96
Botswana	0.91	Zimbabwe	-2.00
Chile	0.90	Macedonia, FYR	-2.11
Tajikistan	0.58	Togo	-2.13
Saudi Arabia	0.40	Fiji	-2.22
Angola	0.40	Guyana	-2.28
Dominican Republic	0.27	Comoros	-2.58
Korea, Rep.	0.17	Turkey	-2.60
Georgia	0.17	United Kingdom	-2.64
Armenia	0.09	Burundi	-2.73
Sweden	0.07	Puerto Rico	-2.76
Australia	-0.01	Mauritania	-2.90
Poland	-0.10	Denmark	-2.96
Papua New Guinea	-0.16	Niger	-3.24
United States	-0.35	Cameroon	-3.33
Moldova	-0.40	Tanzania	-3.44
Guinea-Bissau	-0.61	El Salvador	-3.63
Tonga	-0.62	Senegal	-3.71
Costa Rica	-0.65	Benin	-4.15
Chad	-0.71	Bolivia	-4.16
Nigeria	-0.74	Cote d'Ivoire	-4.20
Belize	-0.78	Suriname	-4.22
Paraguay	-0.83	Pakistan	-4.29
Nicaragua	-0.83	Madagascar	-4.67
Finland	-0.92	Guinea	-4.88
Congo, Dem. Rep.	-0.94	South Africa	-4.94
Burkina Faso	-0.96	Czech Republic	-5.11
Portugal	-1.00	Trinidad and Tobago	-5.27
Djibouti	-1.03	Romania	-5.53
Netherlands	-1.04	Namibia	-5.55
Malawi	-1.07	Iceland	-5.99
New Zealand	-1.09	Bulgaria	-6.20
Kyrgyz Republic	-1.25	Italy	-6.69
Congo, Rep.	-1.27	Antigua and Barbuda	-8.18
Uganda	-1.32	Tunisia	-8.70
Solomon Islands	-1.44	Spain	-8.77

Source: Author's own calculations. Note: The lower is the t-statistic the more statistically significant is the impact of the events that happened between 2011 and 2013 on the respective economy. * We only report the t-statistics for countries that had a negative gap between the actual and synthetic per capita GDP after 2010.

Table A2.7: Averages of Economic and Social Characteristics of GDP after Removing the Republic of Congo, Poland and Sri Lanka*

	Tunisia	Synthetic Tunisia
GCF average 1990-2000	26.0	25.7
GCF average 2001-2010	24.3	24.4
Consumption average 1990-2000	78.1	78.2
Consumption average 2001-2010	78.5	78.4
Imports average 1990-2000	45.1	45.1
Imports average 2001-2010	48.8	48.7
Exports average 1990-2000	41.0	41.0
Exports average 2001-2010	45.9	45.7
Agriculture 1990-2000	14.9	17.2
Agriculture 2001-2010	9.7	12.3
Services 1990-2000	53.3	53.3
Services 2001-2010	60.2	58.5
Life Expectancy at birth (years)	72.5	68.2
Secondary School Enrollement (%)	70.6	71.3
GDP per capita average 1990-1994 (US\$)	5,810	5,801
GDP per capita average 1995-1999 (US\$)	6,636	6,630
GDP per capita average 2000-2004 (US\$)	7,895	7,875
GDP per capita average 2005-2010 (US\$)	9,656	9,634

Source: Author's own calculations. * All variables are in percentage of GDP (%) unless stated otherwise. Synthetic Tunisia: Angola (0.007); Belize (0.22); India (0.222); Lesotho (0.013); Malaysia (0.046); Mauritius (0.26); Moldova (0.027); Peru (0.105); Trinidad and Tobago (0.041); Uzbekistan (0.057).

Table A2.8: Averages of Economic and Social Characteristics of GDP after Taking 3-year GDP per capita averages*

	Tunisia	Synthetic Tunisia
GCF average 1990-2000	26.0	25.7
GCF average 2001-2010	24.3	24.6
Consumption average 1990-2000	78.1	78.2
Consumption average 2001-2010	78.5	78.4
Imports average 1990-2000	45.1	45.0
Imports average 2001-2010	48.8	48.7
Exports average 1990-2000	41.0	41.0
Exports average 2001-2010	45.9	45.5
Agriculture 1990-2000	14.9	16.7
Agriculture 2001-2010	9.7	11.9
Services 1990-2000	53.3	54.0
Services 2001-2010	60.2	58.8
Life Expectancy at birth (years)	72.5	67.7
Secondary School Enrollement (%)	70.6	72.5
GDP per capita average 1990-1992 (US\$)	5,675	5,667
GDP per capita average 1993-1995 (US\$)	6,026	6,021
GDP per capita average 1996-1998 (US\$)	6,641	6,635
GDP per capita average 1999-2001 (US\$)	7,455	7,441
GDP per capita average 2002-2004 (US\$)	8,105	8,094
GDP per capita average 2005-2007 (US\$)	9,134	9,119
GDP per capita average 2008-2010 (US\$)	10,179	10,169

Source: Author's own calculations. * All variables are in percentage of GDP (%) unless stated otherwise. Synthetic Tunisia: Angola (0.002); Belize (0.22); Congo, Rep. (0.065); Djibouti (0.013); Dominican Republic (0.012); Grenada (0.024); India (0.2); Ireland (0.01); Lesotho (0.018); Mauritius (0.179); Moldova (0.019); Panama (0.072); Poland (0.131); Uzbekistan (0.107); Vietnam (0.015).

Table A2.9: ADRL(1) with Jackknife Standard Errors

	(1)
D.log(World _t)	0.258 (0.195)
D.log(Tunisia _{t-1})	-0.084 (0.327)
D.log(World _{t-1})	0.297 (0.275)
AS(2011)	-0.058*** (0.009)
AS(2012)	-0.003 (0.020)
AS(2013)	-0.018*** (0.003)
Constant	0.024 (0.015)
Observations	22
R-squared	0.455

Jackknife standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Note: AS(2011) is a dummy variable that takes 1 for 2011 only and 0 otherwise. AS(2012) is a dummy variable that takes 1 for 2012 only and 0 otherwise. AS(2013) is a dummy variable that takes 1 for 2013 only and 0 otherwise.

Table A2.10: Net Fuel Exports (as a % of GDP)*

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Belize	n.a.	n.a.	-6.3	-5.6	-5	-4.8	-4.5	-5.7	-4.8	-12	-11	n.a.	n.a.	-6.7	-7.4	-12	-3.1	0.6	3.9	0.1	4.1	7.7	1.9	-0.7
Congo, Rep.	n.a.	n.a.	n.a.	52	45	42	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	57	58	44	51	63	58	48
India	-1.8	-2.1	-2.2	-2	-1.8	-2.1	-2.7	-2.3	-2	-3.1	-3.9	-3	-3.1	-3.2	-3.9	-4.9	-5.1	-4.8	-7.5	-4.8	-5	-6.7	-8.4	-7.3
Korea, Rep.	-3.7	-3.4	-3.7	-3.4	-3	-3	-3.5	-4.1	-3.8	-3.6	-5.2	-4.9	-4.3	-4.7	-5.2	-5.7	-6.4	-6.3	-10	-7.5	-8.2	-10	-10	-9.6
Lesotho	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-6.2	-9.2	-7.4	-7.4	n.a.	n.a.	n.a.	-11	-12	-11	-14	-13	n.a.
Mauritius	-4.2	-5	-3.6	-3.7	-3.4	-3.4	-4.1	-4	-3.2	-3.7	-5.4	-4.9	-4.7	-4.6	-5.7	-8.3	-9	-9.2	-10	-6.7	-8.7	-9.9	-9.8	-9.9
Moldova	n.a.	n.a.	n.a.	n.a.	-20	-22	n.a.	n.a.	-19	-19	-20	-16	-14	-14	-14	-16	-19	-18	-18	-13	-14	-10	-9.7	-9.4
Panama	-4.8	-4.3	-4.6	-3.7	-3.8	-4.1	-4.4	-3.9	-2.7	-2.9	-4.9	-4.6	-3.7	-2.8	n.a.	-11	-3.8	-4	-1.9	-0.5	-0.8	-0.7	-2.2	-2.4
Peru	-0	-0.4	-0.5	-0.4	-0.4	-0.7	-0.7	-0.8	-0.6	-0.7	-1.3	-0.9	-0.8	-1	-1.5	-0.7	-0.8	-1	-1.7	-0.3	0.1	0.3	0.5	0.1
Poland	-1.7	-2.7	-1.8	-1.3	-0.8	-0.6	-1.1	-1.3	-0.9	-1.2	-2.2	-1.6	-1.6	-1.9	-1.7	-2.3	-2.4	-2.7	-3.1	-2.3	-2.7	-3.4	-3.6	-2.8
Sri Lanka	-4.1	-3.6	-3.2	-3	-2.5	n.a.	n.a.	n.a.	n.a.	-2.2	-4.1	-3.6	-5	-4	-5.6	-4.9	-6.1	-8.2	-8	-4.6	-4	-6.4	-6	-5.7
Trinidad and Tobago	23	21	19	16	18	22	16	15	10	14	21	14	15	19	21	31	47	29	35	26	24	n.a.	n.a.	n.a.
Tunisia	0.9	0.8	0.8	-0.4	-0.4	-0.6	-0.4	-0.6	-0.3	-0.7	-0.9	-1.4	-1.1	-1.4	-1.3	-1.4	-2.1	0	-1.8	-0.5	-1.1	-2.1	-3.1	-3.7
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Vietnam	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.7	2	4.4	5.1	4.1	3.6	3.3	4.4	5	4.1	1.5	-0.1	1	-0.2	-1.3	-0.1	-0.3

Source: World Development Indicators and author's own calculations. The blue shaded area represents the post-Arab Spring period. Note: Net Fuel Exports (as a % of GDP) are calculated as the difference between Fuel Exports (as a % of GDP) and Fuel Imports (as a % of GDP). * n.a. means not available.

Table A2.11: Averages of Economic and Social Characteristics of GDP after Adding Net Fuel Exports and Metal and Ores Exports to the Initial Set of Covariates*

	Tunisia	Synthetic Tunisia
GCF average 1990-2000	26.0	26.0
GCF average 2001-2010	24.3	24.4
Consumption average 1990-2000	78.1	78.1
Consumption average 2001-2010	78.5	78.5
Imports average 1990-2000	45.1	45.1
Imports average 2001-2010	48.8	48.8
Exports average 1990-2000	41.0	41.0
Exports average 2001-2010	45.9	45.9
Agriculture 1990-2000	14.9	16.3
Agriculture 2001-2010	9.7	11.5
Services 1990-2000	53.3	53.0
Services 2001-2010	60.2	55.0
Life Expectancy at birth (years)	72.5	67.2
Secondary School Enrollement (%)	70.6	69.8
GDP per capita average 1990-1994 (US\$)	5,810	5,813
GDP per capita average 1995-1999 (US\$)	6,636	6,651
GDP per capita average 2000-2004 (US\$)	7,895	7,888
GDP per capita average 2005-2010 (US\$)	9,656	9,652
Net Fuel Exports 1990-2000	-0.2	0.0
Net Fuel Exports 2001-2010	-1.2	-0.6
Ores and Metal Exports 1990-2000	0.4	1.7
Ores and Metal Exports 2001-2010	0.5	2.5

Source: Author's own calculations. * All variables are in percentage of GDP (%) unless stated otherwise. Note: After adding net fuel exports and ores and metal exports the control countries (with their corresponding weights) that compose synthetic Tunisia are: Guinea-Bissau (0.1%); Grenada (0.3%); Malaysia (0.6%); Zimbabwe (1.4%); Seychelles (3%); Peru (3.6%); Belarus (6%); Korea, Rep. (6.6%); India (7.9%); Congo, Rep. (8.2%); Guinea (9.4%); Belize (12%); Mauritius (18.6%); Sri Lanka (22.3%).

Table A2.12: GCF (% of GDP): Normalized Ratio of Post-2010 gap to Pre-2010 gap*

Country	Normalized Ratio	Country	Normalized Ratio
Colombia	0.04	Antigua and Barbuda	1.12
Chile	0.08	Serbia	0.93
Mexico	0.14	Gabon	1.06
Albania	0.15	Costa Rica	1.08
Angola	0.15	South Africa	1.21
El Salvador	0.17	Togo	1.22
Congo, Dem. Rep.	0.21	Croatia	1.28
Brunei Darussalam	0.22	Australia	1.37
Kyrgyz Republic	0.29	Sierra Leone	1.39
Hong Kong SAR, China	0.30	Denmark	1.50
Romania	0.31	Saudi Arabia	1.54
Kuwait	0.32	United Kingdom	1.58
Czech Republic	0.34	Burundi	1.66
New Zealand	0.34	Guatemala	1.66
Bosnia and Herzegovina	0.39	Grenada	1.79
India	0.40	Guinea-Bissau	1.81
Latvia	0.41	Dominican Republic	1.90
Macao SAR, China	0.50	Comoros	2.04
Korea, Rep.	0.54	Hungary	2.16
Cambodia	0.55	Paraguay	2.19
Ethiopia	0.56	Benin	2.21
Zimbabwe	0.57	Belarus	2.31
Kazakhstan	0.59	Switzerland	2.41
Tajikistan	0.63	Nigeria	2.71
Mauritius	0.69	Pakistan	2.80
Belize	0.70	Madagascar	2.81
Cameroon	0.71	Guyana	2.86
Namibia	0.74	Vietnam	3.57
Lesotho	0.77	Cote d'Ivoire	4.81
Ghana	0.81	Haiti	5.56
Poland	0.86	Armenia	5.72
Turkey	0.88	Tunisia	5.92
Iceland	1.13	Malawi	7.43
Slovak Republic	1.15		

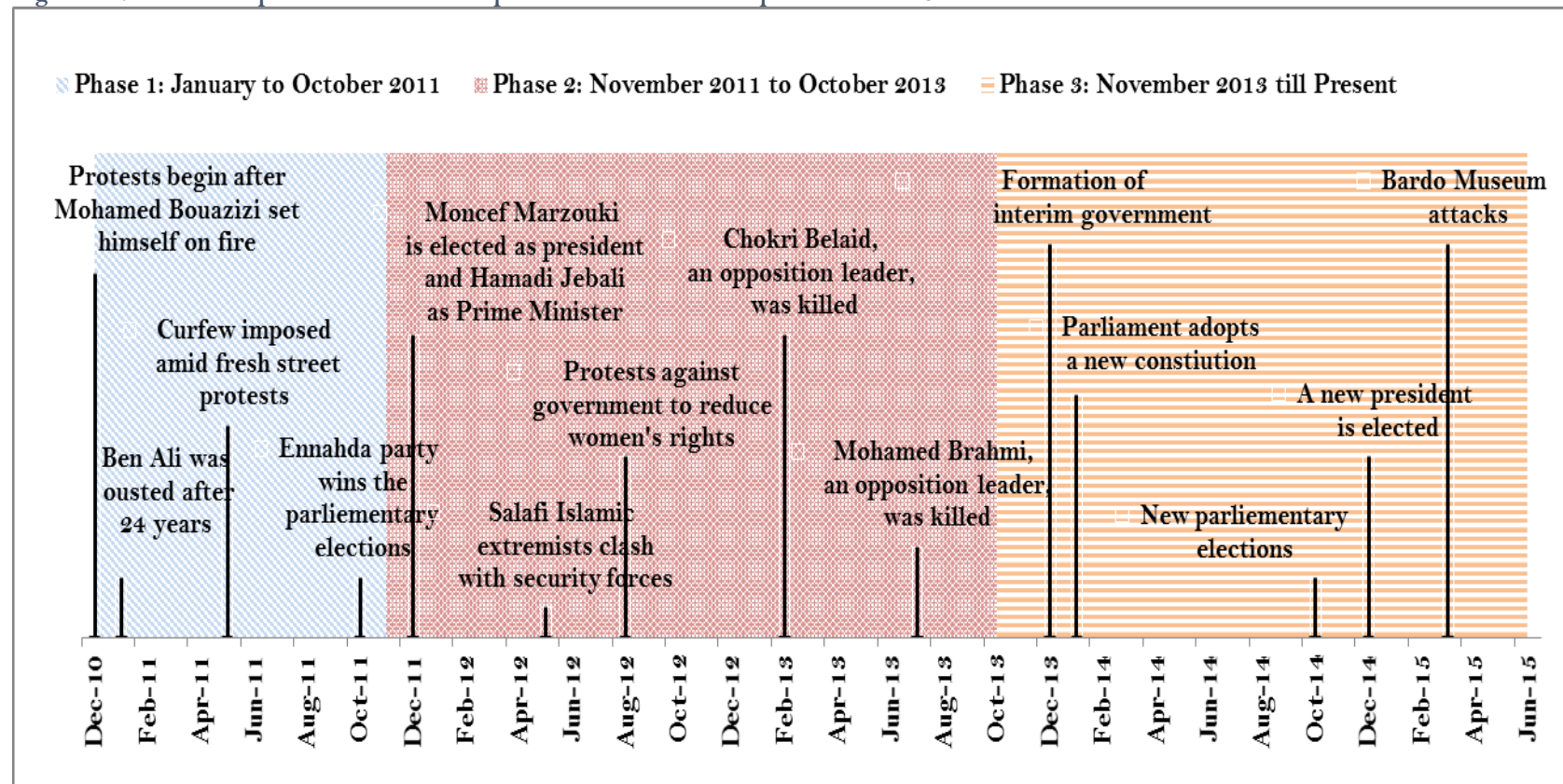
Source: Author's own calculations. Note: The normalized ratio for each country is calculated as the difference between the actual GCF (% of GDP) of each country and that of its synthetic counterpart after 2010 divided by the estimated difference before 2010. The higher this normalized ratio is, the larger is the negative impact of a shock after 2010. * The normalized ratio is only calculated for control countries that exhibited a negative gap between actual and synthetic GCF (% of GDP) after 2010.

Table A2.13: Net Exports (% of GDP): Normalized Ratio of Post-2010 gap to Pre-2010 gap*

Country	Normalized Ratio	Country	Normalized Ratio
Latvia	0.08	Brazil	0.97
Burundi	0.13	Switzerland	1.14
Gabon	0.19	United States	1.16
Antigua and Barbuda	0.27	Paraguay	1.44
Nigeria	0.28	Germany	1.50
Dominican Republic	0.29	Togo	1.52
Pakistan	0.33	Bolivia	1.55
Czech Republic	0.34	Netherlands	1.57
Italy	0.40	Israel	1.63
Macedonia, FYR	0.40	Denmark	1.68
Costa Rica	0.47	Cameroon	1.73
Sweden	0.47	Nicaragua	1.74
Grenada	0.48	Austria	1.83
Colombia	0.50	Uruguay	1.86
South Africa	0.51	Uganda	1.95
Canada	0.56	Norway	1.98
Singapore	0.57	Chile	2.40
Australia	0.58	Belgium	2.62
Samoa	0.61	Venezuela, RB	2.66
Malaysia	0.68	New Zealand	2.66
Belize	0.70	Mexico	2.75
Moldova	0.72	France	3.12
Poland	0.75	Fiji	3.34
Armenia	0.77	Finland	4.29
Trinidad and Tobago	0.83	Tunisia	4.35
Cote d'Ivoire	0.91		

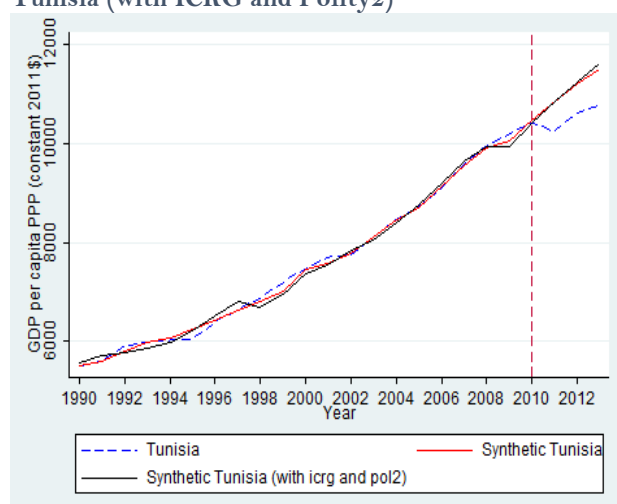
Source: Author's own calculations. Note: The normalized ratio for each country is calculated as the difference between the actual net exports (% of GDP) of each country and that of its synthetic counterpart after 2010 divided by the estimated difference before 2010. The higher this normalized ratio is, the larger is the negative impact of a shock after 2010. * The normalized ratio is only calculated for control countries that exhibited a negative gap between actual and synthetic net exports (% of GDP) after 2010.

Figure A2.1: Tunisia's political transition experienced three distinct periods since 2011



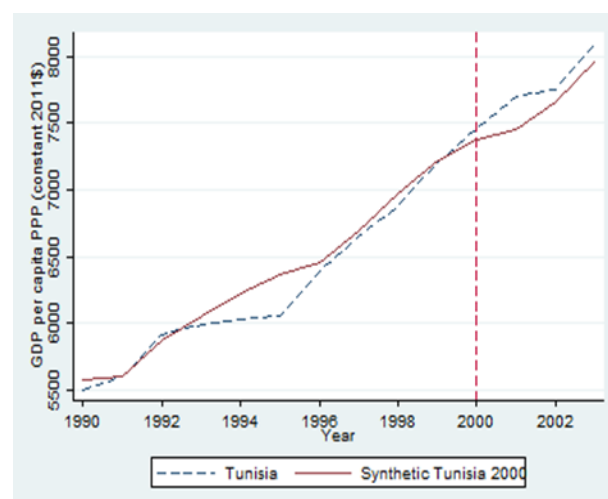
Source: Author's compilation based on <http://www.bbc.co.uk/news/world-africa-14107720>.

Figure A2.2: GDP per capita: Tunisia vs Synthetic Tunisia (with ICRG and Polity2)



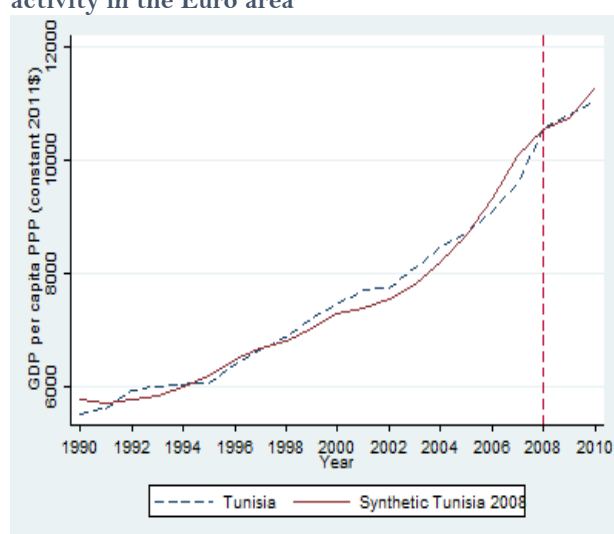
Source: Author's own calculations. Note: Synthetic Tunisia (with icrg and pol2) represents the baseline synthetic Tunisia after adding the ICRG government stability index and polity2 index as covariates.

Figure A2.3: Time series placebo test in 2000



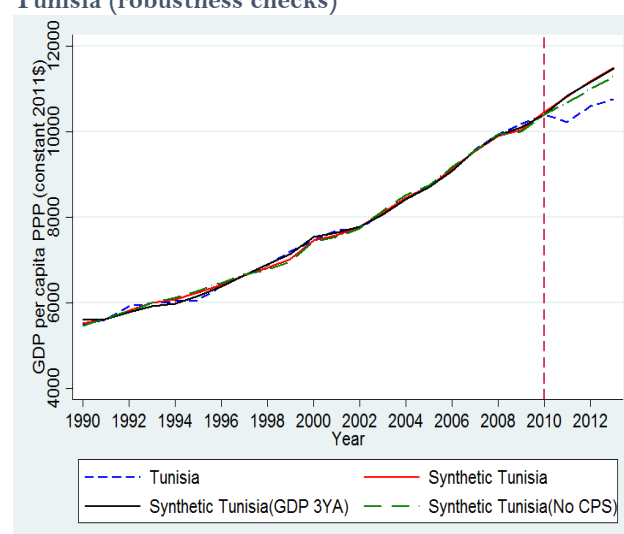
Source: Author's own calculations.

Figure A2.4: Testing the effect of slower economic activity in the Euro area



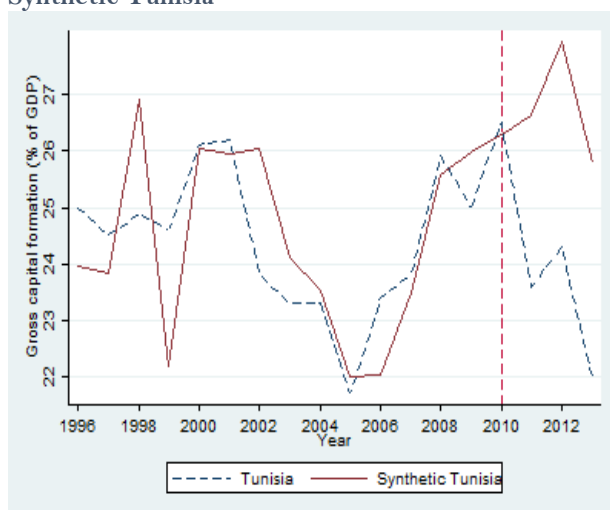
Source: Author's own calculations.

Figure A2.5: GDP per capita: Tunisia vs Synthetic Tunisia (robustness checks)



Source: Author's own calculations. Note: Synthetic Tunisia (No CPS) represents the baseline counterfactual after removing the Republic of Congo, Poland and Sri Lanka from our set of control countries, while Synthetic Tunisia (GDP 3YA) considers the same baseline specification with 3-year averages for the GDP per capita.

Figure A2.6: GCF (% of GDP): Tunisia vs Synthetic Tunisia



Source: Author's own calculations.

Chapter 3 - The Microeconomic Impact of Political Instability: Firm-Level Evidence from Tunisia

3.1 Introduction

Five years after the “Jasmine” revolution of January 2011, Tunisia is still struggling with economic recovery (low growth rates, high unemployment rates and large fiscal and current account deficits) despite the successful, albeit rocky, transition to a democratic regime crowned by the adoption of a new constitution in 2014 (World Bank, 2015). Economists, think-tanks and international institutions have constantly cited political instability as a major cause for the weakened Tunisian economy since 2011.⁵⁶ Consequently, our first research question in this chapter would be: Which firms are mostly affected by political instability? The answer to this question would help policy makers design tools to alleviate the negative impact of the substantial increase in political instability on those firms.

Moreover, and given the large drop in the Tunisian economic activity since 2011 (see chapter 2), one major question policy makers would be interested in is: How to revive the economy? The industrial and services sectors are the backbone of the Tunisian economy representing, on average, 27.8 and 55 percent of GDP during the period 2000–2014, respectively. Therefore, determining the main and most damaging business constraint to firms operating in these sectors would shed light on what policies should be prioritized to revitalize the Tunisian economy. As a result, the second aim of this chapter is to determine which business environment constraint has the biggest adverse impact on firm growth. In particular, we intend to examine whether political instability was the main constraint to Tunisian firms during the post-revolutionary period.

⁵⁶ Arieff and Humud (2015), IMF (2015) and World Bank (2015); among others.

Our focus on exploring the implications of political instability on Tunisian firms is motivated by two stylized facts. First, Tunisia, which was considered a relatively stable country prior to the uprisings, became politically unstable after 2011.⁵⁷ For instance, the number of protests/riots that took place during the period 2011-2014 increased by more than 18 fold compared to the period spanning from 1997 till 2010. Second, 55.2 percent of firms surveyed between 2013 and 2014 considered political instability as a major or very severe problem to their day-to-day operations.

To tackle our two questions, we will use the newly available firm-level data taken from the Tunisian Enterprise Survey (TES) conducted jointly by the World Bank, the European Bank for Reconstruction and Development (EBRD), and the European Investment Bank (EIB) between March 2013 and July 2014. There are two appealing features that make the TES database very suitable for answering our questions. First, and unlike other surveys, this database contains a firm-level measure of political instability defined as the manager's response to how much he/she considers political instability as a constraint to the firm's operations. Second, it includes a wealth of information about firm characteristics which enables us to control for different factors, hence minimizing any possible omitted variable bias. To the best of our knowledge, our study is the first to employ the 2013 Tunisian Enterprise Survey and to analyse the implications of political instability on firm growth in a post-revolution context. However, we fully acknowledge that the limitations of the cross-sectional nature of our data and the use of a subjective measure of political instability, as often

⁵⁷ According to the Political Stability and Absence of Violence (PSAV) measure downloaded from the World Governance Indicators and which ranges from -2.5 (politically unstable) to 2.5 (political stable), Tunisia became much more political unstable after 2011: the PSAV dropped from a 0.08 average during the 2007-2010 period (pre-revolution) to a 0.74 negative average during the 2011-2014 period (post-revolution).

the case in most micro-level surveys that have been used in the literature to investigate the microeconomic impact of political instability (Brück et al., 2016), calls for designing systematic surveys that would provide valuable micro-data on political shocks across place and time.

This chapter contributes to and builds upon features from various related literatures. First, we add to the existing literature on the firm determinants of business obstacles (Beck et al., 2005; Kounouwewa and Chao, 2011; Vargas, 2015) by exploring, for the first time, which characteristics can best explain firms' perception of political instability as a business constraint. Second, this chapter is related to the earlier research on the relationship between different business environment obstacles and firm growth (Aterido et al., 2011; Ayyagari et al., 2008; Fisman and Svensson, 2007; Hallward-Driemeier et al., 2006; among many others). In contrast to this strand of the literature, which focused on using cross-country datasets, we examine which constraint is the most damaging to companies operating in a politically unstable country such as Tunisia in the aftermath of the Arab Spring. In that context, this chapter is also connected to the recent literature that analysed the impact of conflicts and revolutions from a firm-level perspective (Abadie and Gardeazabal, 2003; Collier and Duponchel, 2013; Klapper et al., 2013; O'Reilly, 2015; Pshisva and Suarez, 2010).

The findings of this chapter are two-fold. First, we show that political instability is a major concern for small and exporting firms as well as those that are operating in the tourism sector, those that have suffered from acts of vandalism or arson and those that are located in the interior region of Tunisia. Second, and more importantly, we find strong evidence that political instability was the most damaging constraint to firm growth (defined as firm sales growth) during the post-revolutionary period. This result, which suggests that improving the security and political conditions will be crucial for boosting economic confidence and

therefore revitalizing the weakened economy, is confirmed after addressing potential endogeneity problems (measurement error and reverse causality biases), using an instrumental variable (IV) estimation strategy with region-sector-size averages as benchmark instruments. Our findings are robust to using employment growth as an alternative measure of firm performance and to considering various business constraint levels.

The rest of this chapter is organized as follows. Section 3.2 discusses possible channels through which political instability might impact firms. Section 3.3 briefly reviews the previous research that examined the impact of business constraints on firm performance and surveys the literature that analysed the impact of conflicts from a micro-level perspective. Section 3.4 presents and describes the data, while section 3.5 explores which firm characteristics can best explain firms' perception of political instability as a business environment obstacle. This is followed by section 3.6 which determines the most damaging constraint to firms' growth and section 3.7 which performs some robustness checks. Finally, section 3.8 concludes.

3.2 How Does Political Instability Impact Firms?

This section discusses, based on the existing literature, possible channels through which political instability that stemmed from the Tunisian revolution might have impacted firms.

First, firms in the tourism sector (hotels, restaurants, etc.) are usually impacted the most by political instability and deteriorating security conditions. The impact of terrorism, one of the facets of political instability, on tourism has been extensively documented in the literature.⁵⁸ A consensus has emerged that terrorism, and hence political instability,

⁵⁸ See Enders and Sandler (1991), Drakos and Kutan (2003), Neumayer (2004) and Llorca-Vivero (2008), among others.

negatively affects the tourism sector. The reason is that tourists perceive countries in turmoil as riskier, and as a result they prefer to alter their travel plans to safer countries; “apart from the direct destruction of infrastructures or the existence of victims, uncertainty seems to be a key element of the indirect cost associated to this phenomenon. This may be particularly true for tourism” (Llorca-Vivero, 2008, p. 171).

Second, companies located in regions that experience considerable social unrest and large number of protests may suffer from a disruption in the production process due to workers’ absenteeism (Krueger and Mas, 2004; Mas, 2008) and a higher cost of production (Shonchoy and Tsubota, 2016). Third, firms operating in war-torn regions become less productive as conflicts that last for long periods tend to reduce the skills of workers. This degeneration of skills, defined by Collier and Duponchel (2013) as “forgetting by not doing”, would induce a loss in human capital and therefore a reduction in firm productivity, not only in the short-term, but also in the long-term as human capital takes time to reconstruct.

Fourth, political instability may lead to a currency crisis especially in countries such as Tunisia with low foreign reserve buffers by causing a currency devaluation, which in turn (i) reduces the value of firm assets and their generated profits and (ii) increases the cost of imports. For instance, Fielding and Shortland (2005) showed that political violence in Egypt during the 1990s reduced (increased) demand for the local currency (US dollar).

Fifth, political chaos may indirectly impact firms’ performance as higher levels of corruption would worsen the business environment. Campante et al. (2009) argued that incumbents tend to steal more during episodes of political instability because they are not certain whether they will remain in power in the long run. Accordingly, the authors expect

corruption, in the form of diverting public resources directly to the incumbents' pockets, to increase.

Sixth, political instability creates uncertainty which discourages investment that is partly irreversible as it includes a fixed cost "that cannot be recovered if market conditions turn out to be worse than expected" (Pindyck and Solimano, 1993, p. 259).⁵⁹ More specifically, political turmoil induces firms to postpone investment decisions in "anticipation of possible negative changes in the country's macroeconomic, taxation, or monetary policies, or in the regulatory environment in general" (Julio and Yook, 2012, p. 49), hence reducing their investment expenditures. For instance, Julio and Yook (2012) found, using a panel dataset of 248 elections held in 48 countries during the 1980-2005 period, that corporate investment falls by around 4.8 percent during the election year, mainly because of higher uncertainty about the future political leadership.

Based on the above, we argue that the increased level of instability after the 2011 revolution impacted Tunisian firms through three main channels, among others. First, the long and protracted period of transition from an autocratic to a democratic regime created uncertainty about the future political and economic agendas, and as a result Tunisian companies may have postponed investment decisions. Second, we suspect that firms operating in the tourism sector were the most hit by the political instability that stemmed in the aftermath of the revolution as this sector accounted for, an average, of 6.1 percent of real GDP between 2001 and 2010 and employed around 26 percent of the total labour force (World Bank, 2013b). Third, the marked increase in protests and strikes since 2011, particularly in the interior region of Tunisia, might have reduced firm productivity as social unrest created

⁵⁹ For more details about the theory of irreversible investment see Dixit (1992) and Dixit and Pindyck (1993).

distractions for both workers and managers, hence diverting the attention away from their regular job duties (Ashraf et al., 2015). Moreover, firms might have shut down when employees participated in the strikes.

3.3 Literature Review

In this section, we start by briefly covering the previous research that examined the impact of business constraints on firm performance using World Bank Enterprise Surveys (WBESs) and proceed by reviewing the nascent literature that explored the impact of conflicts and political turmoil from a micro-level perspective.

3.3.1 The Effect of Business Climate on Firm Performance

This section explores the literature that used WBESs to assess the relationship between various business climate indicators and firm performance.⁶⁰

Batra et al. (2003) were the first to use WBESs in order to assess the relation between business constraints and firm performance. In particular, they relied on the initial WEBS conducted in 80 countries between 1999 and 2000, with a minimum of 100 companies surveyed in each country. They found evidence that firm performance, measured by either sales or investment growth over a three-year period, was negatively related to financing constraints, corruption, higher taxes, inefficient business regulations, and policy uncertainty. Moreover, their econometric regressions suggested that small firms are generally more adversely impacted by business constraints than big firms. Following this work, and given that WBESs were later made available to the public,⁶¹ economists have extensively used this

⁶⁰ An extensive review of the various research questions tackled using World Bank Enterprise Surveys can be found in Dethier et al. (2011) and World Bank (2004).

⁶¹ These surveys are freely available for researchers and policymakers who can register online and access the raw data using the following link: <http://www.enterprisesurveys.org/data/survey-datasets>. As of August 2016, enterprise surveys have been conducted by the World Bank and its partners in 135 countries around the world.

kind of surveys to better understand the association between business conditions and firm performance.

For instance, Beck et al. (2005) used a WBES composed from more than 4,000 firms in 54 countries to examine whether legal, financing and corruption constraints affect firm performance, proxied by sales growth over the past three years. They found that all three constraints adversely impact firm growth, with small firms being the most affected. In a closely related study, Aterido et al. (2011) explored a WBES dataset composed of 56,000 companies from 90 countries surveyed between 2000 and 2006. They found that inefficient business regulations and lack of finance adversely impact employment growth of full-time employees, specifically for micro (less than 10 employees) and small firms (between 11 and 50 employees). On the other hand, they found that medium (between 51 and 200 employees) and large (more than 200) enterprises, which tend to rely on more sophisticated manufacturing techniques, are particularly damaged by infrastructure bottlenecks and corruption.⁶²

Moreover, Fisman and Svensson (2007) used the Ugandan Industrial Enterprise Survey conducted by the World Bank between January and June 1998 to examine the impact of corruption and taxation on firms' annual growth sales between 1995 and 1997. Their OLS and IV estimates, based on a sample of 243 Ugandan firms, suggest that bribery and taxation rates depress firm growth, with the effect of the former being three-fold larger than the latter. Meanwhile, Hallward et al. (2006) used an Investment Climate Survey of 1,500 Chinese companies to examine the effect of various business constraints on different firm performance indicators: investment rate, employment growth, sales growth and total factor productivity.

⁶² The main difference between the paper by Beck et al.(2005) and the one by Aterido et al (2011) is that the latter used objective measures of business constraints (percentage of working capital financed externally, the number of days without power or water, etc.), while the former employed self-reported opinions about how much each issue is perceived as a business constraint by firm managers.

Utilizing objective rather than subjective business constraint measures, they found that foreign and privately owned firms grow faster. In addition, they found that corruption and the regulatory burden, defined as the managers' time spent in dealing with regulatory requirements (for example taxes), reduce employment and sales growth. On the other hand, they did not find evidence that infrastructure and financing constraints significantly impact firm performance. According to the authors, the latter result, which contrasts with those found consistently in the literature (Aterido et al., 2011; Ayyagari et al., 2008; Beck et al., 2005), reflects the inefficiency of state-owned banks in China.

More recently, Krauss (2015) analysed the correlates of firm job growth across twelve East Asian and Pacific countries⁶³ using WBESs conducted between 2009 and 2012. In contrast to previous studies which pooled data for all countries into one regression, he ran individual regressions for different countries separately. According to him, this approach is more suited to capture specific country characteristics (labour regulations, tax regulations and macroeconomic policies, etc.) that cannot be captured using micro WBES data. Overall, he found that receiving a loan from a commercial bank is positively associated with firm growth, while paying bribes and power outages were not major business constraints to firms.

The closest study to ours is the one by Ayyagari et al. (2008) which employed the WBES conducted by the World Bank in 80 developing countries between 1999 and 2000 to determine the most binding constraints to firm growth defined as "firm sales growth over the past three years" (Ayyagari et al., 2008, p. 488). Using standard regressions and the Directed Acyclic Graph (DAG) approach, they found that out of the 10 listed business environment

⁶³ The twelve countries are: China, Fiji, Indonesia, Lao PDR, Micronesia, Mongolia, the Philippines, Samoa, Timor-Leste, Tonga, Vanuatu and Vietnam.

constraints policy instability, crime and finance are the most binding (or damaging)⁶⁴ to firm growth, with the latter having the biggest and most robust direct effect. However, and as noted by the authors themselves, the study “examines cross-country firm-level regressions and therefore does not detail the experience of any single country in depth” (Ayyagari et al., 2008, p. 486). In particular, cross-country regressions have two limitations. First, they ignore heterogeneity among countries with distinct legal, regulatory and financial systems. Second, their estimation results might be driven by trends in big countries such as India and China which have large survey samples (Krauss, 2015). Therefore, when we focus on countries that were exposed to revolutions and a long and continuous period of volatile political governance, such as Tunisia in the aftermath of the 2011 revolution, we expect political instability to become the most binding constraint to firms.

3.3.2 The Impact of Conflicts and Political Instability from a Micro Perspective

Conflicts have devastating effects not only in terms of the number of victims, injuries, and capital destruction but also on economies. As detailed in section 2.3.2 in chapter 2, research in this field of economics has mainly concentrated on the effects of conflicts from a macroeconomic perspective. The main conclusion from this literature is that macroeconomic variables are adversely impacted by armed conflicts and political instability (Alesina and Perotti, 1996; Blomberg et al., 2004; Collier, 1999; Hoeffler and Reynal-Querol, 2003; Venieris and Gupta, 1986; among others).⁶⁵

On the contrary, the empirical literature on the economic impact of conflicts and political instability from a micro perspective is more scant, albeit growing rapidly mainly due to the

⁶⁴ We will use the words binding and damaging interchangeably in the rest of the paper.

⁶⁵ For an extensive review the reader is referred to Blattman and Miguel (2010).

improvement in the collection of micro data.⁶⁶ In particular, there is a lack of understanding on how firms are impacted by conflicts and political turmoil. According to Brück et al. (2012, p. 9) “a major reason for this undoubtedly is that it is difficult to obtain high-quality micro-level data from countries and regions in conflict. Firm-level data are particularly hard to obtain”. However, understanding the channels through which conflicts and/or political instability affect firm behaviour is important from a policy maker’s perspective in order to design better policies aimed at weathering the adverse economic impact of conflicts.

This section provides a literature review of the previous studies that have examined the impact of conflicts from a micro-level perspective. One of the first few papers that addressed this issue was the paper by Abadie and Gardeazabal (2003). In this study, the authors examined whether the fourteen-month ceasefire announced by the Basque terrorist group, ETA, between 1998 and 1999 had a differential impact on the returns of Basque stocks, defined as “stock of firms with significant part of their business in the Basque country” (Abadie and Gardeazabal, 2003, p. 122), and those on non-Basque stocks. To perform their analysis, the authors developed two “buy-and-hold” portfolios:⁶⁷ the first, called Basque, was composed of the stocks of 14 Basque firms, whereas the second, called non-Basque, was composed of the stocks of 59 non-Basque firms. Using the Fama-French Three Factor model, they estimated an OLS regression where the dependent variable is the excess return on the buy-and-hold portfolio corresponding to the Basque and non-Basque stocks. The authors found that the coefficient on the dummy variable that represented the period where the truce was considered as credible was positive and significant for Basque firms, while small and insignificant for the

⁶⁶ Brück et al. (2016) review the challenges associated with measuring violent conflicts from a micro perspective.

⁶⁷ “Buy-and-hold portfolios represent the portfolio of a passive investor who constructed a value-weighted Basque or non-Basque portfolio at the beginning of our sample period” (Abadie and Gardeazabal, 2003, p. 123).

non-Basque firms. Hence, the results suggested that firms operating inside (outside) the Basque region were positively impacted (not impacted) by the peace agreement.

Collier and Duponchel (2013) argued that in low-income countries, conflicts that last for a long period tend to reduce the skills of workers. This degeneration of skills, defined by the authors as “forgetting by not doing”, would induce a loss in human capital and therefore a reduction in firms’ productivity. Consequently, firms operating in regions of high conflict intensity will not only be the most affected during the conflict, but also after the end of the conflict as human capital, which takes time to reconstruct, becomes scarce. In order to test their theory, the authors considered the Sierra Leone conflict which lasted from 1991 to 2002 and used firm level data from the 2007 World Bank Enterprise Survey coupled with household data examined by Bellows and Miguel (2009). Their variable of interest, intensity of war in a certain region, was calculated based on the latter survey as the average of households’ answer to four questions related to the conflict.⁶⁸ However, Collier and Duponchel were concerned with endogeneity bias resulting from omitted variables as higher intensity regions may have had certain features that would have made them more prone to be impacted by conflicts. For that reason, they used the distance between each region and Monrovia as an instrumental variable based on the assumption that the closer the region is to the Liberian capital the more brutal the conflict would be.⁶⁹ After investigating the effect of conflict intensity on the size of firms, their income and their willingness to train their employees, they found that enterprises operating in high intensity regions (i) are smaller in terms of the employment level, (ii) have a lower income and (iii) have a greater need to train

⁶⁸ The four questions according to Collier and Duponchel (2013, p. 74) are: (i) “Were any members of your household killed during the war?”; (ii) “Were any members of your household injured/maimed during the war?”; (iii) “Did anyone from this community/neighborhood die as the result of the conflict?”; and (iv) “Were any members of this community/neighborhood injured/maimed as a result?”.

⁶⁹ Collier and Duponchel (2013) document in footnote 15 of their study that the civil war in Sierra Leone was orchestrated by Liberia.

their employees. These results are in accordance with their theory of “forgetting by not doing”, which suggests that firms operating in regions of high conflict intensity do not exhibit a significant recovery effect after the end of the war because they suffer from a scarcity of human skills.

Considering Côte d’Ivoire as their case study, Klapper et al. (2013) used an enterprise level dataset of 7,010 firms covering the agriculture, manufacturing, trade and services sectors collected over the period 1998-2003 to examine whether the impact of political unrest, that surged in 2000 following the parliamentary and presidential elections, was different among enterprises that were employing or owned by foreigners. The authors used a two-step empirical approach. First, they estimated a production function from which they recovered total factor productivity (TFP) as the residual from the model. Second, they used a fixed effect approach and regressed the estimated TFP on (i) whether an enterprise is foreign owned or employs foreign employees and (ii) a conflict intensity measure computed based on the ACLED⁷⁰ database as “the number of armed conflicts as reported per year by department, per 100,000 inhabitants” (Klapper et al., 2013, p. 13). Their results suggest that the TFP dropped by 12 and 18 percent in 2000 and 2001, respectively, since the increase in violence in 2000. However, the impact was heterogeneous as the increased conflict intensity decreased the TFP of enterprises employing at least one foreign worker, mainly from West African countries, by an additional 9.7 percent compared to enterprises that had only domestic employees. According to the authors, these findings indicate that firms employed fewer foreign workers in order to mitigate the impact of the conflict which was dominated by hostile sentiments towards foreigners.

⁷⁰ ACLED stands for the “Armed Conflict Location and Event Data Project”.

After presenting papers that have analysed the impact of conflicts in Africa, we now move to studies that have examined the impact of the Colombian conflict on firm behaviour.⁷¹ Pshisva and Suarez (2010) used department level data, covering the 1996-2002 period, to study the impact of kidnapping on firm investment decision in Colombia.⁷² They found that criminal actions that directly targeted owners or firm managers lowered investment, whereas different kinds of kidnapping that did not explicitly target senior personnel, did not have a statistically significant impact on firms' investment decisions. In a separate study, Camacho and Rodriguez (2013) examined the impact of the armed conflict in Colombia on firm exit using municipal level data of manufacturing firms with more than ten employees between 1993 and 2004. The armed conflict variable was measured as the sum of all attacks launched by different armed groups, paramilitary and guerilla groups,⁷³ in each municipality. After controlling for possible reverse causality issues using the instrumental variable technique, the authors found that the armed conflict had a positive and statistically significant impact on industrial firms' decision to exit the market. Furthermore, their estimations suggested that small, very young and very old firms were the most impacted by the hostilities.

In a more recent study, O'Reily (2015) examined whether the impact of property rights protection and access to external finance on firms' decision to reinvest their profits differed during a post-conflict period. For that purpose, he used a cross-section dataset taken from the 2002 and 2005 World Bank Business Environment and Enterprise Performance Survey for

⁷¹ "The Colombian conflict is one of the longest ongoing domestic confrontations in the world, surpassed in length only by the Israeli-Palestinian and the Indian-Pakistani conflicts" (Camacho and Rodriguez, 2012, p. 96).

⁷² "Colombia is divided into thirty two departments or semiautonomous administrative units. Colombian departments are similar to states in the United States, but have substantially less legislative autonomy" (Pshisva and Suarez, 2010, p. 70).

⁷³ The guerrilla groups are the National Liberation Army (ELN) and the Revolutionary Armed Forces of Colombia (FARC).

twenty-six countries in Central and Eastern Europe, five of which were considered as post-civil war countries: Azerbaijan, Bosnia and Herzegovina, Georgia, Serbia/Montenegro and Tajikistan. The author employed an ordered logistic regression given the categorical nature of the dependent variable, firm profit reinvestment. To measure property rights protection, two categorical variables were used as proxies: firm managers' perception towards the legal system in solving business disputes and managers' answer to how often they bribe. On the other hand, access to finance was proxied using both the proportion of capital funded by trade credit and a dummy variable equal to one if a firm obtained a loan from a supplier or a bank. The results suggested that the protection of property rights is a more important determinant of a firm decision to reinvest its profits for those companies operating in a post-conflict context. Moreover, the authors found that, in contrast to the general case, access to finance is not a determinant of firms' investment decision during a post-conflict period. Consequently, the author concluded that post-conflict countries should prioritize reforms in legal institutions over access to finance.

Until now, we have covered previous research that focused on the microeconomic impact of armed conflicts, rather than strikes and political protests because, to the best of our knowledge, there are no studies that explored the economic effects of these events on firms, apart from one recent analysis by Shonchoy and Tsubota (2016). In this paper, the authors evaluated the effect of political protests (known as hartals) on manufacturing firms in Bangladesh. They hypothesized that politically motivated strikes impact firms through two main channels: directly through increasing the total cost of firms by halting or delaying the production process as a result of road blockades and workers absenteeism, and indirectly through changes in input prices (such as those of labour, capital, energy and material goods). To test these hypothesis, they used the 2007 and 2013 World Bank Enterprise Survey datasets that included 1,232 Bengali firms and estimated a Seemingly Unrelated Regression

(SUR). Their results were in favour of the first channel as political strikes were found to reduce firm productivity by significantly increasing the total cost of production. On the other hand, they did not find evidence that companies re-optimize their input factors in response to politically motivated strikes.

3.4 Data and Descriptive Statistics

This section introduces the dataset used in this chapter and analyses descriptively the business environment constraints to Tunisian firms. In particular, we rely on the 2013 Tunisian Enterprise Survey (TES) which was conducted jointly by the World Bank, the European Bank for Reconstruction and Development (EBRD), and the European Investment Bank (EIB). The sampling unit of analysis is the “Establishment” which we denote interchangeably in what follows as firm or enterprise. While several papers have previously used this kind of survey to answer different questions in various countries and regions, our study is the first to employ the 2013 Tunisian Enterprise Survey in a context of analysing the implications of political instability on firms.

The TES dataset, which was recently collected through personal interviews with Tunisian firm managers/owners between March 2013 and July 2014, is formed of 592 enterprises. The sample was stratified according to three levels: region, industry and firm size. More specifically, it includes enterprises located in the regions of Tunis (capital), Sfax, Northeast, South Coast/West and the Interior. It also covers enterprises in the retail (10.6 percent), services (33.5 percent) and manufacturing (55.9 percent) sectors,⁷⁴ as well as small (36 percent), medium (41 percent) and large (23 percent) firms employing 5 to 19, 20 to 99, and more than 100 employees, respectively. In addition, the TES contains a wealth of

⁷⁴ Note that firms operating in the financial intermediation, renting, public and real estate sectors are not part of the TES.

information about firm operations grouped into thirteen general topics: biggest obstacle, finance, informality, performance, workforce, corruption, firm characteristics, infrastructure, regulations and taxes, crime, gender, innovation and technology, and trade.

This dataset records several firm characteristics including: firm size, age, and export activity, whether the firm is foreign owned, the manager's years of experience, his/her gender and education level, and finally whether a firm received any subsidies from national or international institutions. Table B3.1 (in the appendix of this chapter)⁷⁵ lists the definitions and different categories of each firm characteristic. Another nice feature of the TES is that managers have reported (retrospectively) the actual sales figures of their corresponding companies for the years 2009 and 2012. This data allows us to measure firm performance as the real sales growth rate between 2009 and 2012. Given that these sales were reported in nominal terms, we deflated them using the Consumer Price Index (CPI) taken from the World Development Indicator published by the World Bank.⁷⁶ We trimmed the first and last two percentiles of our data in order to avoid outliers.⁷⁷ As a result, our sample is slightly reduced from 592 observations to 569. Table B3.2 presents summary statistics of the above firm characteristics.

⁷⁵ All tables starting with a "B3" are in appendix B of this chapter.

⁷⁶ Ideally, we would have deflated nominal sales using the Producer Price Index (PPI) as we are focusing on firms. Unfortunately, the Tunisian Institute of Statistics publishes monthly data regarding the Price Index of Industrial Sales (PIIS) starting from January 2014 only, which means we do not have data that covers our period of interest (2009–2012). However, the correlation between the yearly growth of CPI and that of the PIIS was 0.89 between January 2015 and December 2016, suggesting that using the PIIS instead of the CPI will not have a significant impact on our results. Moreover, both the CPI and the GDP deflator increased by 13.7 percent between 2009 and 2012; hence supporting our assumption that the CPI is a good variable to deflate the nominal sales figures.

⁷⁷ The original dataset included firms that had a real sales growth between 2009 and 2012 of more than 500 percent. These observations pushed the distribution to be extremely right skewed. Using the Shapiro–Wilk test we could reject the null hypothesis that the sales growth variable was normally distributed as the z statistic was 12.7. When we trimmed the first and last two percentiles of our data, the Shapiro–Wilk test still rejected the normality assumption, however with a much lower z statistic of 7.4, implying that variable sales growth is much closer to the normal distribution than before.

Primarily, the TES questionnaire asks firm managers to what extent the 17 possible business environment obstacles, presented in Table B3.3, have an impact on firms' operations.⁷⁸ In particular, the question used to gauge the perception of a firm manager towards a certain constraint is: "To what degree is constraint X an obstacle to the current operations of this establishment?" The answers to that question include a five point scale ranging from "No Obstacle" coded as 0, "Minor Obstacle" coded as 1, "Moderate Obstacle" coded as 2, "Major Obstacle" coded as 3, and "Very Severe Obstacle" coded as 4.⁷⁹

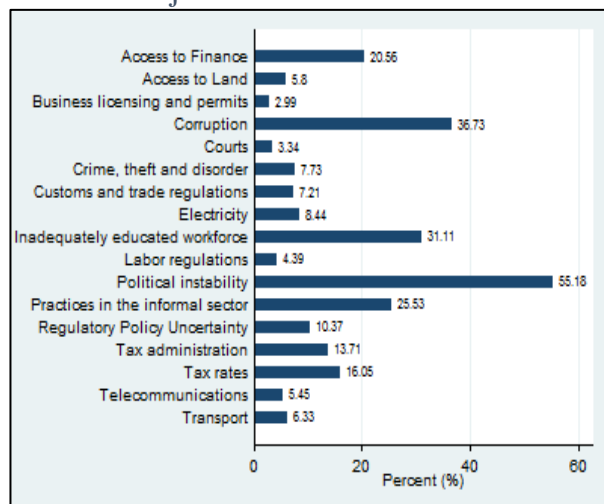
Figure 3.1 presents the proportion of surveyed firms that considered each constraint as a major or very severe problem to their functioning. Political instability clearly stands out as the most worrying obstacle to firms' operations followed by corruption and inadequately educated labour force. Meanwhile, business licensing and permits, courts, labour regulations, and access to land and transport were seldom perceived as major issues. The fact that political instability was the most commonly perceived constraint is not surprising given the unparalleled surge in political instability events since the onset of the Tunisian revolution. Indeed, using data compiled by the Armed Conflict Location and Event Data Project (ACLED) between 1997 and 2014, we clearly see, as illustrated in Figure 3.2, a sudden jump in different political instability events during the post-revolutionary period. For instance, the total number of protests/riots that took place during the period 2011-2014 increased by more than 18 fold compared to the period spanning from 1997 till 2010 (green line in Figure 3.2).

⁷⁸ Both the services and manufacturing sectors have almost identical questionnaires with only one addition to the latter regarding capacity measures such as hours of operation and the use of production capacity. Given the high similarity between these two questionnaires, we will be referring to both of them as "the questionnaire".

⁷⁹ Two other possible answers to this question were "Don't know" and "Does not apply" which were coded initially by -9 and -7, respectively. Given that these answers may distort our results, we recoded these observations as missing.

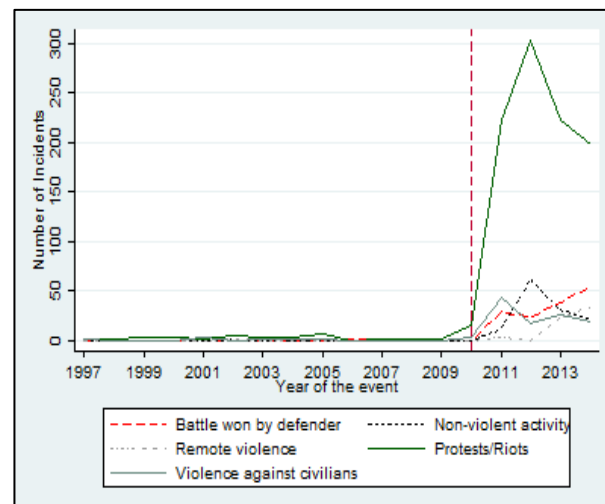
A brief description of the ACLED database as well a definition for each conflict event reported in Figure 3.2 can be found in appendix A of this chapter.

Figure 3.1: Proportion of enterprises considering the issue a major or severe constraint



Source: TES and author's own calculations.

Figure 3.2: Conflict events in Tunisia over time



Source: ACLED database and author's own calculations.

Moreover, the average answers to each constraint, reported in Table B3.3, cement our earlier observation that Tunisian firms consider political instability to be, by far, the most severe obstacle to their operations. In fact, among the 17 obstacles, political instability had the highest average answer of 2.4 in the overall sample (column 1). While its magnitude varies slightly by firm characteristics, sectors and regions, this constraint was uniformly considered as the most severe constraint to firm growth. On the other hand, access to land, business licensing and permits, courts, crime theft and disorder, customs and trade regulations, labour regulations, electricity, telecommunications and transport had an average below 1 over the whole sample and across different firm characteristics; suggesting that these issues were seldom considered as obstacles to Tunisian firms.

One possible drawback of our analysis is the use of subjective data (managers' perception towards a certain issue as a constraint) as measures of business environment constraints. According to Bertrand and Mullathinathan (2001), subjective measures used typically in surveys may be affected by general waves of optimism or pessimism which may induce a

measurement error of the true impact of a certain obstacle to firm growth. However, several studies found evidence of a significant relationship between different perception based measures and objective variables.⁸⁰ In particular, Hallward-Driemeier and Aterido (2009) analysed an Enterprise Survey database containing 79,000 firms from 105 countries and found that thirteen subjective investment climate obstacles were positively and significantly correlated with their corresponding objective measures taken from the survey itself or from external sources. To test whether these associations hold in our data, we follow Hallward-Driemeier and Aterido (2009) and estimate the following Ordered Probit model for each subjective measure for which an objective counterpart is available in the TES database:

$$\textit{Subjective Const}_i = \alpha + \beta_1 \times \textit{Objective Const}_i + \delta_d + \varepsilon_i. \quad (3.1)$$

In equation (3.1) *Subjective Const_i* is the categorical variables that ranges from 0 (no obstacle) to 4 (very severe obstacle) representing firm *i*'s perception towards a certain issue as a business environment obstacle (as defined earlier), while *Objective Const_i* is an objective measure corresponding to the subjective constraint selected based on the literature (Hallward-Driemeier and Aterido, 2009; Krauss, 2015). Table B3.4 lists the objective variables corresponding to each subjective measure in addition to the definition of the former. Finally, δ_d is an industry dummy variable which captures the fact that firms in different industries may be more impacted by certain obstacles (e.g. firms in labour intensive sectors may be more impacted by labour regulations than firms that rely more on capital).

As reported in Table B3.5, out of the nine perception based constraints that have a corresponding objective measure in the TES,⁸¹ eight have a positive and statistically

⁸⁰ See Pierre and Scarpetta (2004), Hallward-Driemeier and Aterido (2009) and Contessi and Nicola (2013).

⁸¹ For the following eight subjective measures of business environment constraints, the TES database did not have objective measures: Courts, Labour regulations, Political Instability, Regulatory Policy Uncertainty, Tax administration, Tax rate, Transport.

significant β_1 , meaning that as the real business environment worsens, the probability that a firm perceives this constraint as more damaging to its growth increases.⁸² Therefore, the variation in the subjective measures of business constraints used in the TES captures, albeit not perfectly, the actual impact of these constraints on firms. Before proceeding, we should note that the insignificance of the estimated coefficient for the customs and trade regulation constraint may be due to the fact the objective variable (number of days to obtain an import license) is not a good measure of the trade environment. For instance, around 20 percent of firms have reported customs and trade regulation as an obstacle to their functioning even though they have not even applied to obtain an import license.

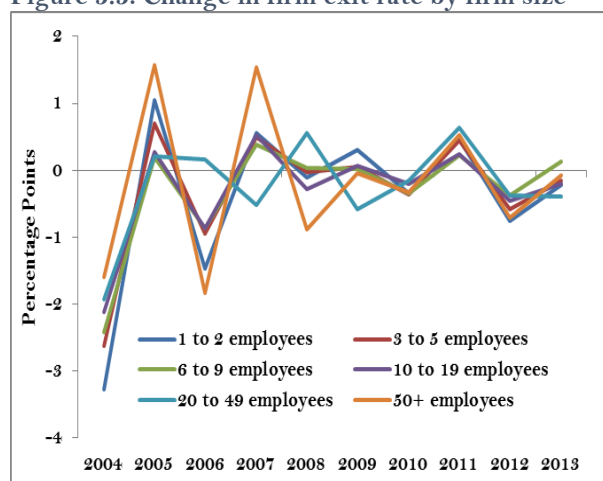
Notwithstanding the fact that most subjective measures were significantly correlated with their objective counterparts, we argue that the political instability constraint, which we are mostly interested in, and which does not have any objective counterpart in the TES, suffers from a strong measurement error. In particular, De Haan (2007) argued that political instability indicators tend to be measured with error, because researchers tend to focus on one dimension only (e.g. political violence, armed conflicts, mass civil protest, instability of the political regime, etc.), while in reality the concept of political instability is multidimensional as argued in the political science literature (Hibbs, 1973; Jong-A-Pin, 2009; Rummel, 1963; Tanter, 1966). Consequently, when estimating the impact of political instability on firm growth, the corresponding coefficient is likely to be biased downward.

In addition, it is noteworthy to mention that the TES may suffer from a sample selection problem, because if firm exit as a result of the 2011 revolution was not random, then our

⁸² Given our interest in the relationship between subjective and objective measures of business environment constraints, it suffices to look at the sign and significance of the β_1 's without looking at the marginal effects which determine the reaction of the subjective measure (*Subjective Const_i*) to a one unit increase in its objective counterpart (*Objective Const_i*).

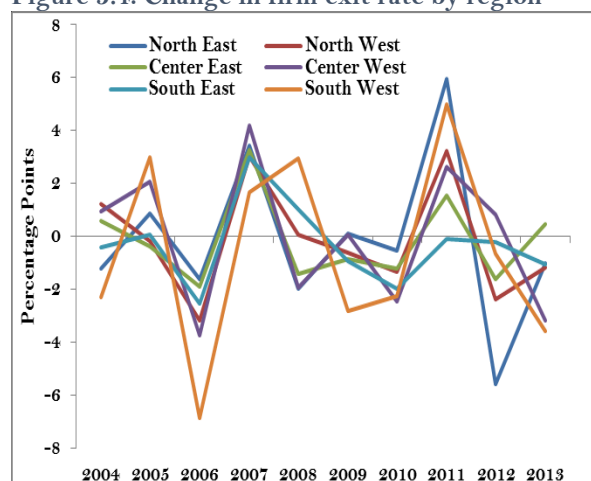
results may be biased. Unfortunately, it is not possible to address this potential survivor bias as the TES data does not cover the pre-revolution period. However, aggregated level data from the Répertoire National des Entreprises (RNE) published by the Tunisian National Institute (TNI) can be used to shed light on the firm exit rate dynamics across different regions and size classifications. In particular, substantial differences in firm exit changes after 2011 would signal that the revolution had a substantial differential impact on firm exit among various categories; thereby increasing the likelihood of a possible survivor bias. As illustrated in Figure 3.3 and Figure 3.4, the change in firm exit rate⁸³ followed, since 2011, a similar path across different size classifications and regions, respectively, indicating that the increase in firm exit in 2011 was random and not particular to a certain group of firms. Therefore, there is no (observable) evidence supporting any firm survivor bias.

Figure 3.3: Change in firm exit rate by firm size



Source: RNE database and author's own calculations.

Figure 3.4: Change in firm exit rate by region



Source: RNE database and author's own calculations.

3.5 Determinants of the Political Instability Constraint

In this section, we explore which firm characteristics can best explain firms' perception of political instability as a business environment obstacle. Building on section 3.2, we start by presenting theoretical arguments on why certain enterprises might perceive political turmoil as a more significant constraint than others.

⁸³ We define firm exit rate as the number of firms that exited the market in year t divided by the total number of firms in the market at the end of year $t-1$ multiplied by 100.

First, exporting firms might be more impacted by higher levels of political instability as they become, during periods of political turmoil, less competitive vis-à-vis their international competitors due to higher costs of production and a degeneration of human capital skills (Collier and Duponchel, 2013). Second, small companies tend to perceive political instability as a bigger impediment to their operations (relative to large firms) because they have fewer resources and buffers to survive during periods of turmoil. In addition, small firms do not have as much bargaining power as large firms in order to influence policy makers and obtain preferential treatments. For instance, during recessions, large enterprises “might threaten to lay off workers if they do not get tax reductions” (Schiffer and Weder, 2001, p. 4). Third, political turmoil would be a lesser constraint to firms with more experienced managers as those would be more able to find efficient solutions during periods of instability given that they have already dealt with similar situations in the past. As stated by Sayegh et al. (2004, p. 186), “a manager with past experience with events similar to the current crisis may have assumptions about the cause of the crisis through matching the current situation with his/her existing narrative schema, and thus might be able to make more effective decisions based on these assumptions”. Fourth, firms in different sectors might perceive political instability as an obstacle differently. In particular, and as earlier explained, firms operating in the tourism sector are more vulnerable to higher levels of political instability as international tourism is a luxurious activity with a high income elasticity of demand (Lim, 1997). Therefore, tourists cancel, postpone or substitute their touristic plans to more secure countries in the wake of higher levels of political instability (Sönmez and Graefe, 1998).⁸⁴ Fifth, higher levels of education allow individuals to cope more efficiently with sudden changes in the economic

⁸⁴ “Political instability may not be as blatant as terrorism; it does, however, present just as formidable a barrier to international tourism. Continuous media coverage of political rebellion, military coups, or regional wars can deter tourists from choosing to travel to specific destinations or even entire regions” (Sönmez and Graefe, 1998, p. 114).

environment. For instance, Schultz (1975) argued that more educated farmers are more successful during periods of disequilibria and changing economic environments. Sixth, during periods of unrest, acts of vandalism and arson tend to increase, hence adversely affecting firm productivity because these events are usually coupled with road blockades and damage to the infrastructure. Kamal and Kaiser (2015) showed that the Bengali readymade garment (RMG) sector was negatively impacted by acts of arson and vandalism that happened on the eve of the parliamentary elections in 2013.

In addition to the above firm attributes, and in order to minimize any possible bias stemming from omitted variables, we add the following firm characteristics, based on the literature that has previously explored which firms were mostly associated with different business environment obstacles:⁸⁵ firm age, foreign company (a dummy variable equals 1 if foreign individuals or companies hold at least 50 percent of the firm shares and 0 otherwise), manager's gender and a subsidy proxy (a dummy variable equals 1 if the establishment received any subsidies from national or international institutions and 0 otherwise).⁸⁶

Before proceeding, we calculate the simple correlations between the political instability constraint and the different firm attributes we are considering. All correlations mentioned here are significant unless stated otherwise. As reported in Table B3.6, larger and older firms perceive political instability as a lower constraint than small and younger firms, respectively. Furthermore, the political instability constraint seems to be much higher for firms operating

⁸⁵ Kounouwewa and Chao (2011) and Vargas (2015) examined the determinants of financial obstacles, while Beck et al. (2005) determined the firm characteristics that can explain variation in the legal and corruption constraints. Moreover, Carlin et al. (2006) explored the firm determinants of financing and customs regulation obstacles.

⁸⁶ Beck et al. (2005) argued that the subsidy dummy can be used to capture the different market structures in which firms might operate.

in the tourism and services sectors. On the contrary, firms operating in the food industry and those with experienced managers are less worried by that obstacle.

While the simple correlations are suggestive, we employ an ordered probit model to examine which firm characteristics can explain much of the variation in firms' perception of political instability as a constraint to their functioning:

$$\begin{aligned} Pol\ Obst_i = & \alpha + \beta_1.Size_i + \beta_2.Age_i + \beta_3.Exporter_i + \beta_4.Foreign_i \\ & + \beta_5.Manag\ Exp_i + \beta_6.Manag\ Gen_i + \beta_7.Manag\ Educ_i \\ & + \beta_8.Subsidy_i + \beta_9.crime_i + \gamma'[\mathbf{sector}] + \varepsilon_i \end{aligned} \quad (3.2)$$

In equation (3.2), the dependent variable $Pol\ Obst_i$ which ranges between 0 and 4 is higher the more firm i considers political instability as a larger constraint to its operations, while ε_i is a vector of independent and identically distributed error terms. To account for heteroscedasticity, we use robust standard errors. Moreover, $\mathbf{sector}$ is a vector of dummy variables corresponding to each sector (food, other manufacturing, retail, tourism and other services)⁸⁷ introduced to account for industry effects as firms from different sectors might be impacted differently by political instability.

We are interested in the sign and statistical significance of the coefficients on each of the explanatory variables. A positive (negative) and significant coefficient means that firms with that given attribute consider political instability as a higher (lower) obstacle to their growth than firms that do not have this attribute. If a coefficient is statistically insignificant, this means that the respective attribute does not influence firms' perception of political instability as a business constraint. The estimation results of equation (3.2), displayed in specification 1 of Table 3.1 (below), indicate, as suggested by the theoretical arguments, that firm size, manager's experience, exporting firms and those that are in the tourism sector as well as

⁸⁷ The garment sector is the omitted category.

enterprises that suffered from acts of vandalism and arson are all good predictors of the political instability constraint that companies report. We also find that firms operating in the food industry have a significantly negative coefficient, indicating that they are less concerned by political instability as food demand is inelastic and would be less likely to witness volatility at times of political turmoil.

When looking at the economic significance, using Average Marginal Effects (AMEs), available in column 2 of Table 3.1, we find that exporting firms and those operating in the tourism sector are, on average, 6.5⁸⁸ and 14.4 percent more likely to perceive political instability as a very severe obstacle to their growth, respectively. In contrast, firms in the food industry sector are 8.6 percent less likely to perceive political instability as a very severe obstacle. The first two columns of Table 3.1 also indicate that on average, firms' perception of political instability relates negatively to firm size, with smaller (larger) firms reporting it as a higher (lower) business constraint.⁸⁹ But this relation is only significant for small firms with a 6.6 percent higher probability of perceiving political instability as a very severe obstacle.⁹⁰ Furthermore, a 1 percentage point increase in losses resulting from crime actions (vandalism, arson, etc.) is associated with a 3.6 percent higher likelihood of considering political instability as a very severe obstacle. The estimation results also show that firms with

⁸⁸ We should note that exporting firms might also have been impacted by deteriorating economic conditions in the export destination countries, such as the conflict in Libya which represented Tunisia's second export market after the European Union prior to the 2011 uprisings (African Development Bank, 2011). Unfortunately, we could not control for that as we do not have information about the major exporting destination market for each firm.

⁸⁹ The medium size firms are the omitted category.

⁹⁰ There are two potential explanations why small firms might perceive political instability as a bigger constraint. One possibility is that small companies are impacted by a different treatment in the sense that they might be closer to riots and violent incidents. Unfortunately, the TES dataset does not reveal the geocoded data corresponding to each firm, preventing us from testing this hypothesis. Another possibility, which we presented above, is that during prolonged periods of political instability, small companies have fewer financial resources to survive. Further research, based on more disaggregated data, is required to distinguish between these propositions.

more experienced managers are significantly less worried by political instability. However, in terms of magnitude, the association is relatively small as firms having a manager with 10 more years of work experience are, on average, only 3 percent less likely to perceive political instability as a very severe constraint. Meanwhile, the manager's gender and education level as well as the age of the firm and whether it receives a subsidy or is foreign owned, do not significantly explain the variation in firm's perception of political instability.

Table 3.1: Ordered Probit model of Political Instability regressed on firm characteristics

	Specification 1		Specification 2	
	Coefficient	AME(4)	Coefficient	AME(4)
Small	0.227** (0.111)	0.066** (0.033)	0.236** (0.111)	0.068** (0.033)
Large	-0.161 (0.121)	-0.040 (0.030)	-0.175 (0.122)	-0.043 (0.029)
Age	-0.001 (0.003)	-0.000 (0.001)	-0.000 (0.003)	-0.000 (0.001)
Exporter	0.237** (0.109)	0.065** (0.030)	0.245** (0.110)	0.067** (0.030)
Foreign	-0.193 (0.190)	-0.053 (0.052)	-0.190 (0.192)	-0.052 (0.052)
Manag Exp	-0.012*** (0.005)	-0.003*** (0.001)	-0.011** (0.005)	-0.003** (0.001)
Manag Gend	-0.060 (0.200)	-0.017 (0.055)	-0.074 (0.205)	-0.020 (0.056)
Manag Educ	0.063 (0.089)	0.017 (0.024)	0.059 (0.090)	0.016 (0.025)
Subsidy	0.008 (0.135)	0.002 (0.037)	-0.014 (0.136)	-0.004 (0.037)
Food	-0.312** (0.158)	-0.086** (0.044)	-0.326** (0.160)	-0.089** (0.044)
Other Manuf	-0.155 (0.162)	-0.043 (0.044)	-0.208 (0.162)	-0.057 (0.044)
Retail	-0.073 (0.159)	-0.020 (0.044)	-0.081 (0.165)	-0.022 (0.045)
Other Serv	0.077 (0.157)	0.021 (0.043)	0.066 (0.160)	0.018 (0.044)
Tourism	0.521** (0.264)	0.144** (0.072)	0.447* (0.262)	0.122* (0.071)
Losses due to crime (% of sales)	0.132*** (0.050)	0.036*** (0.014)	0.131*** (0.045)	0.036*** (0.012)
Tunis			-0.119 (0.135)	-0.032 (0.036)
Sfax			-0.103 (0.144)	-0.028 (0.038)
South Coast/West			-0.047 (0.131)	-0.013 (0.036)
Interior			0.430** (0.192)	0.138** (0.065)
Observations	555	555	555	555

Note: Robust standard errors in parentheses. *, **, *** indicate significance levels of 10%, 5%, and 1%, respectively. The dependent variable is the political instability constraint which takes five values ranging from 0 to 4. The omitted categories are medium firms and the garment sector. Losses due to crime (% of sales) denote the estimated losses as a result of theft, robbery, vandalism or arson that occurred on the firm's premises as a percentage of total annual sales in 2012. Columns 2 and 4 represent the average marginal effects (AME) on the probability that firms considering political instability as a very severe constraint to their operations.

As argued by Collier and Duponchel (2013), firms operating in regions of high conflict intensity will be the most affected by a conflict. To examine whether firms are concerned about political instability across different regions, we introduce regional dummies to equation (3.2). Columns 3 and 4 of Table 3.1 present, respectively, the estimation results and corresponding AMEs of that model, which we denote by specification 2. While the sign and statistical significance of earlier results are unchanged, only the coefficient on the dummy variable corresponding to the Interior region is significantly correlated with how firms perceive political instability. In terms of magnitude, firms in the Interior region are, on average, 13.8 percent more likely to perceive political instability as a very severe obstacle to their growth. This large association is not surprising given that the interior region, which was economically and socially marginalized relative to the coastal areas, experienced the highest number of political instability events since the revolution erupted early 2011. Figure A3.1 in appendix A of this chapter further asserts, based on the ACLED database, that the actual number of reported political incidents that took place between 2011 and 2014 was the highest in the interior region of Tunisia.⁹¹ In particular, this region includes two cities that were at the heart of the Jasmine revolution: Sidi Bouzid which was the birthplace of the Tunisian revolution from which protests against Ben Ali's regime commenced after Mohamed Bouazizi set himself on fire in its streets on 17 December 2010, and Gafsa city, the mining capital of Tunisia, which was hit severely in the aftermath of the revolution as unemployed job-seekers paralyzed the mining industry, a pillar of the national economy.⁹² Moreover, this

⁹¹ In the ACLED database, data about the number political instability events (protests, attacks against civilians, remote violence, non-violent activity and battle won by defender) are reported at the governorate level (there are 24 governorates in Tunisia), while data in the TES are stratified into five regions. To merge the two datasets, we referred to the "Tunisia 2013 Enterprise Surveys Data Set Implementation Report" that describes the governorates included in each of the five regions.

⁹² Section 2.2.2 in chapter 2 describes how the mining industry was affected by the Tunisian uprisings. In addition, firms operating in Gafsa may have had another reason for considering political instability as an obstacle to their functioning as the city experienced a major revolt in 2008 (against unfair hiring practices by the state-run Gafsa Phosphate Company) that turned into riots and was then brutally repressed by Ben Ali's regime (Beinin, 2016).

finding is consistent with the literature on the determinants of political unrest, which argues that instability events occur more often when people feel marginalized because of extreme poverty (Miguel, 2007) and/or high youth unemployment (Azeng and Yogo, 2013; Urdal, 2006).⁹³

To sum up this section, our results show that political instability is a major concern for small and exporting firms as well as those that are operating in the tourism sector, those that have suffered from acts of vandalism or arson and those that are located in the Interior region of Tunisia.

3.6 The Most Binding Constraint to Firm Growth

This section examines which business environment constraint was the most damaging to firm growth in Tunisia during the post-revolutionary period.

Here, we define an obstacle to be damaging if it has a statistically significant and negative impact on firm growth, defined as the firm real sales growth rate between 2009 and 2012. To answer our question we start by determining which out of the seventeen business environment obstacles, listed in Table B3.3, are damaging using the general-to-specific modelling strategy. In particular, we regress firm growth on all the different obstacles while controlling for different firm characteristics, and then eliminate the constraint with the highest positive (or lowest negative) t-ratio, one at a time, until we end up with only negative and statistically significant coefficients. Econometrically speaking, our OLS regression is:

⁹³ Young and unemployed people are also used by political parties to cause trouble in return for money. In the case of Bangladesh, Shonchoy and Tsubota (2016, p. 6) states that “political parties hire people, mostly those who are relatively young, poor, unemployed and want to make quick money. These paid supporters occupy the major streets of the city and terrorize ordinary citizens and businesses with blockades, violence, and other forms of intimidation”.

$$Firm\ Growth_i = \alpha + \theta' [Potential\ Constraints] + \delta' [FC] + \varepsilon_i \quad (3.3)$$

where **[Potential Constraints]** is a vector containing the seventeen potential constraints; **[FC]** is a vector of controls containing various firm characteristics that have been extensively used in the literature (see for instance Aterido et al., 2011; Beltrán, 2016; Krauss, 2015; Pfeifer, 2015) to examine the determinants of firm performance: firm age (and age squared), its export activity, its legal status, whether its foreign owned, the percentage of the firm owned by the government, and the manager's years of experience, his/her education level and gender. Consequently, a constraint $c = 1, \dots, 17$ is damaging to firm growth if its corresponding coefficient θ_c is negative and statistically significant. Table 3.2 (below) reports the estimation results of equation (3.3). Due to space constraints, we do not report all the stages of the general-to-specific strategy.⁹⁴ Column 1 shows that, when we regress sales growth rate on all the obstacles, access to finance, political instability and tax administration yield significantly negative coefficients. However, after adopting the general-to-specific strategy, column 3 shows that only the coefficients on access to finance and political instability remain negative and statistically significant, implying that these two constraints are damaging to firm growth rate.⁹⁵ Subsequently, the most damaging obstacle would be the one that has the largest coefficient in absolute value. In particular, when normalizing the results of this specification, we find that a one-standard deviation increase in the access to finance and political instability constraint is associated with a 2.6 and 3.2 percent decrease in firm growth rate, respectively; suggesting that the latter is the most damaging constraint.

⁹⁴ All the regression details of the general-to-specific strategy are available in Table B3.7 in appendix B of this chapter. Notice that the coefficient for the customs and trade regulations obstacle falls out after the first regression because it had the highest t-ratio.

⁹⁵ As shown in column (4) of Table B3.7, the coefficient on tax administration becomes statistically insignificant after omitting tax rates. This is likely do to a multicollinearity problem as the correlation between these two constraints was 0.75.

Table 3.2: Impact of Obstacles on Sales Growth

	OLS			IV	
	(1)	(2)	(3)	(4)	(5)
Acc Fina	-4.449*** (1.350)	-3.549*** (1.330)	-3.586*** (1.273)	-6.564** (2.744)	-6.493** (3.204)
Acc Land	-1.967 (2.018)	-1.135 (2.051)			
Licen and Perm	-1.296 (2.484)	0.323 (2.475)			
Corrup	1.454 (1.507)				
Courts	0.266 (2.539)	1.595 (2.526)			
Crime	0.443 (2.206)	1.124 (2.231)			
Cust and Trd Reg	5.901*** (1.896)				
Inadeq Workfor	-0.682 (1.381)	0.866 (1.355)			
Labor Regul	3.584* (2.173)				
Pol Inst	-6.177*** (1.658)	-4.686*** (1.506)	-4.317*** (1.387)	-10.935*** (2.961)	-10.920*** (3.366)
Reg Policy Uncert	-3.059* (1.822)	-0.790 (1.768)			
Informal Compet	0.693 (1.239)	0.757 (1.222)			
Tax Admin	-4.362* (2.288)	-0.707 (1.620)			
Tax Rates	4.561** (2.293)				
Elec	-1.050 (1.678)				
Telecom	3.470 (2.583)				
Transp	2.233 (2.020)				
Additional Controls	Yes	Yes	Yes	Yes	Yes
Observations	518	519	520	520	498
F-test (Access to Finance regressi				88.4	41.9
F-test (Political Instability regres:				75.6	31.0
Overidentification test (p-value)					0.77

Notes: Robust standard errors in parentheses. *, **, *** indicate significance levels of 10%, 5%, and 1%, respectively. The dependent variable is the real firm sales growth rate between 2009 and 2012. In all regressions the set of firm characteristics includes: the firm age (and age squared), its export activity, its legal status, whether its foreign owned, the percentage of the firm owned by the government, and the manager's years of experience, his/her education level and gender. The endogenous variables are the political instability and access to finance constraints. In column 4, the region-sector-size average of each endogenous variable is used as a respective instrument. In column 5, we add the following two instruments: (i) firm losses as a percentage of annual sales resulting from crime events (vandalism, arson, etc.) and (ii) region-sector-size average of the access to finance objective measure.

However, our OLS results might suffer from two possible sources of biases: measurement error and reverse causality. As explained in section 3.4, the political instability constraint may be measured with error as firm managers may not consider all the dimensions of political instability when answering the surveyor's question. Moreover, a reverse causality bias may exist as low-performing firms tend to report more stringent constraints, whereas successful firms have the necessary resources to overcome certain obstacles and improve the business environment (Dethier et al., 2011). To overcome these endogeneity issues and take into account the data limitation (e.g. the cross-sectional nature of the data) which does not allow us to control for firm-fixed effects and deal with any potential survivor bias, we employ an Instrumental Variable (IV) estimation strategy.

Despite the richness of the TES, finding reliable instruments that satisfy the standard instrumental variable assumptions (exclusion and strong instruments) is challenging. As a solution, we minimize potential endogeneity biases by employing region-sector-size averages as benchmark firm-specific instruments. This approach, which has been introduced by Friedman (1957) and reviewed by Angrist and Krueger (2001), is a widely recognized practice in the literature to address endogeneity problems when using perception based measures of the business environment as explanatory variables (Amissah and Stack, 2016; Ayyagari et al., 2008; Beltrán, 2016; De Rosa et al., 2010; De Waldemar, 2012; Desai and Olofsgård, 2011; Fisman and Svensson, 2007). In taking grouped averages, it is unlikely that a firm's individual performance affects the perception of other companies within the same group (region-sector-size), implying that the "direction of causality is likely to run from the average obstacles to individual firms, not vice versa" (Ayyagari et al., 2008, p. 499); satisfying the exclusion restriction assumption. At the same time, it is likely that firms operating in the same environment (region-sector-size) have similar perceptions towards certain business obstacles. Hence, we expect our selected instruments to be significantly correlated with individual firm

perceptions toward business environment obstacles; satisfying the strong instrument assumption. Moreover, taking group averages as instruments deal with potential measurement errors which are generally firm specific, and therefore uncorrelated with the average constraint values (Angrist and Krueger, 2001; Fisman and Svensson, 2007).

The results of the IV regression are reported in column 4 of Table 3.2. The F-statistics for both first-stage regressions are higher than 10 – rule of thumb below which instruments are considered to be weak (Staiger and Stock, 1997) – suggesting that both instruments are strong. Moreover, the first-stage regressions, reported in panel A of Table B3.8, show positive and highly significant relationships between each instrument and its respective endogenous variable. Consequently, when accounting for endogeneity, the coefficient on political instability remains statistically significant at the 1 percent level, while that on access to finance loses some significance. In addition, the magnitude of the former becomes much larger than the latter reinforcing our main finding that political instability is the most damaging constraint to firm growth in Tunisia after the Arab Spring.

Notice that, compared to the OLS regression (column 3), the magnitude of the estimates on both access to finance and political instability increase with the IV (column 4). While the increase is relatively smaller for the former, the large difference between the magnitudes of the OLS and IV estimates on the political instability coefficient is not surprising given that this variable is likely to suffer, as explained in section 3.4, from a measurement error leading to an attenuation bias in the OLS results.

In order to test the exogeneity of the instruments using the Sargan test of overidentifying restrictions, we include one additional instrument for each endogenous variable. In fact, the additional instruments are objective measures, thereby reducing further any measurement

error (Aterido et al., 2011; Krauss, 2015). For the political instability constraint, we use firm losses as a percentage of the 2012 annual sales stemming from crime events (vandalism, arson, theft, etc.).⁹⁶ As shown in Table 3.1, this measure is significantly and positively correlated with the political instability constraint suggesting that firms' perception of political instability is likely to be influenced by the extent to which they have suffered from acts of arson or vandalism; satisfying the strong instrument assumption. Moreover, crime events (theft, vandalism, robbery, etc.) are likely to be exogenous with respect to firm characteristics, as these are often associated with mass protests and riots that happen at the regional and national level during periods of revolution without necessarily targeting specific firms (Roberts, 2012; Roman, 2013; Tadjoeeddin, 2013).⁹⁷ Therefore, we argue that this instrument also satisfies the exclusion restriction assumption.

The additional possible instrument for the access to finance obstacle would be the region-sector-size average of its objective counterpart which is the reason why a firm did not apply

⁹⁶ An ideal instrument for the subjective political instability measure would have been the actual number of protests and strikes that happened in Tunisia after the revolution at a spatial level. As mentioned in section 3.5, we tried to use the number of protests, strikes and riots from the ACLED database; however, the two datasets could only be merged at the regional level which boils down to 5 regions (hence 5 observations), preventing us from exploiting spatial variation. Moreover, the variable (a3x) which represents the "Name of city/town/village" was missing from the TES database. We contacted the World Bank Enterprise Survey team to explore whether we can have access to this data but their response was the following: *"Due to our protocols to ensure respondent confidentiality, the values for a3x are not published as it would make several respondent firms directly identifiable in the data"*. As a simple exercise, the correlation between the subjective political instability measure (from the TES) and the actual number of political instability events (from the ACLED database) for the 5 matched regions was positive (0.3) and statistically significant at the 1 percent level, suggesting that the relationship between these two variables is relatively strong.

⁹⁷ In the Tunisian case, anecdotal evidence suggests that acts of vandalism did not target specific firms; rather they happened during protests against high unemployment rates and poverty levels. For example, the following articles document some acts of vandalism during mass protests that occurred in the aftermath of the 2011 revolution: (i) <http://news.yahoo.com/tunisia-announces-nationwide-curfew-protests-000037792.html> and (ii) <http://english.alarabiya.net/articles/2013/01/13/260237.html> and (iii) <http://www.economist.com/news/middle-east-and-africa/21567991-economic-neglect-menacing-fragile-new-democracy-democracy-and-riots>.

for commercial bank loan.⁹⁸ Table B3.5 demonstrates that this objective measure, is positively and significantly correlated with the access to finance constraint reported by firm managers, implying that companies which did not need to apply for a loan because they had sufficient internal resources did not consider access to finance as an impediment to their operations; hence satisfying the strong instrument assumption. Moreover, and as argued above, taking the region-sector-size average helps in minimizing endogeneity issues as firms' individual characteristics are not directly impacted by aggregate obstacles at the group level.

While one of the two additional instruments do not enter significantly in the first-stage regressions, presented in columns panel B of Table B3.8, the coefficients on both variables have positive signs that are consistent with our expectations. The F-statistics, governing the joint significance of all the instruments and presented at the bottom of column 5 in Table 3.2, remain first and foremost well above 10, justifying the inclusion of the new instruments. In addition, the Cragg-Donald minimum eigenvalue statistic also suggests that the null of weak correlation between the instruments and the endogenous variables is rejected, since the calculated value (19.2) is greater than the tabulated critical values (16.9 at the 10 percent level). Most importantly, the overidentifying restrictions test indicates that the null of instruments exogeneity cannot be rejected as the p-value was 0.77. Finally, these results, based on this larger pool of instruments, are not different from the baseline findings hence asserting that political instability remains the constraint with the most significant and negative coefficient.

In summary, this section shows that political instability was the most damaging constraint to firm growth in Tunisia after the Arab Spring.

⁹⁸ The definition of the objective measure corresponding to the access to finance obstacle is available in Table B3.4 in appendix B of this chapter.

3.7 Robustness Check

In what follows, we perform two robustness checks. First, we explore whether our baseline results are sensitive to using employment growth as different measure of firm performance.⁹⁹ Consequently, we replicate the same regressions as equation (3.3) whilst considering employment growth between 2009 and 2012 as the dependent variable.¹⁰⁰ The results of these specifications are highlighted in Table B3.9. Following the general-to-specific strategy, we find, as reported in columns 1, 2 and 3, that the damaging constraints to employment growth are political instability and an inadequately educated workforce. The coefficient of the latter, however, is only significant at the 10 percent level and its magnitude is half of the former, indicating that political instability is also the most damaging constraint to employment growth. Our results are also confirmed when accounting for endogeneity using region-sector-size averages and firm losses as a percentage of the 2012 annual sales stemming from crime events as firm specific instruments. In both IV specifications (columns 4 and 5), the coefficient on the inadequately educated force becomes insignificant, while that on political instability remains strongly significant and its magnitude increases. Most importantly, these results indicate that, irrespective of how growth is measured, political instability is the most damaging constraint to firm performance.

Second, and while the baseline results (section 3.6) determine which constraint is, on average, the most damaging to Tunisian firms, they do not inform us whether firms tend to react differently at various business constraint levels. To tackle this question, we re-estimate the regressions presented in columns 3 and 5 of Table 3.2, while disaggregating each

⁹⁹ Dollar et al. (2005), Hallward-Driemeier et al. (2006), Aterido et al. (2011), Trentini and Koparanova (2013) and Stel and Naudé (2016) have all considered employment growth as an alternative/complementary measure of firm performance.

¹⁰⁰ Our measure of employment at year 2009 (2012) is the number of full-time employees at the end of 2009 (2012).

damaging constraint (access to finance and political instability) into three separate dummy variables: No obstacle (equals 1 if firm i does not consider issue X as a constraint), Small obstacle (equals 1 if firm i considers issue X a minor constraint) and Big Obstacle (equals 1 if firm i considers issue X as moderate, major or very severe constraint).¹⁰¹ The results reported in Table B3.10 suggest that Tunisian firms can cope with low levels of political instability and financing constraints. On the other hand, higher levels of political instability tend to have a significantly increasing adverse impact on firms.¹⁰² To compare the appropriateness between the aggregated model (Table 3.2) and the one with grouped dummies (Table B3.10), the J and Cox-Pesaran statistics are used.¹⁰³ Considering the financing constraints, both statistics indicate that the two models should not be rejected as their p-values are higher than 10 percent. On the other hand, when focusing on political instability, the model with disaggregated levels seems to be the preferred one.¹⁰⁴ Consequently, we conclude that the disaggregated level is more useful in explaining how firms' sales growth is impacted by political instability.

Overall, the two robustness tests confirm that political instability was the most damaging constraint to Tunisian firms after the Arab Spring.

¹⁰¹ The No Obstacle category was omitted.

¹⁰² Unfortunately, the survey does not provide details about the different dimensions of political instability, which prevents us from determining which dimension (e.g. political violence, armed conflicts, mass civil protest, instability of the political regime, etc.) is the most damaging to Tunisian firms.

¹⁰³ The J and Cox-Pesaran statistics are usually used to compare the appropriateness between two non-nested models.

¹⁰⁴ For the financing constraint, the p-values of the J and Cox-Pesaran were, respectively, 0.41 and 0.23 (0.42 and 0.17) for the aggregated (disaggregated) model. On the other hand, for the political instability constraint, the p-values of the J and Cox-Pesaran were, respectively, 0.06 and 0.02 (0.54 and 0.27) for the aggregated (disaggregated) model.

3.8 Conclusion

This chapter explores the impact of political instability on firms. To do so, we consider Tunisia, which experienced a surge in political instability following the 2011 Jasmine revolution, as our case study. We initially investigate which firms perceive political instability as an impediment to their operations and then determine which business environment constraint was the most damaging to firm growth. In particular, we are interested in examining the previously unexplored implications of political instability on firm growth in a context of mass civil protest.

To answer our questions, we use the newly available firm-level data taken from the 2013 Tunisian Enterprise Survey (TES). Unlike other surveys, the TES contains a firm-level measure of political instability and several firm characteristics, which enables us to control for different factors, hence dealing with a possible omitted variable bias.

We show that political instability is a major concern for small and exporting firms as well as those that are operating in the tourism sector, those that have suffered from acts of vandalism or arson and those that are located in the Interior region. Most importantly, we find strong evidence that political instability was the most damaging constraint to firm growth in Tunisia after the Arab Spring.

Unfortunately, our data suffers from two main limitations. First, in terms of quality, we only have a multidimensional measure of political instability, which prevents us from testing whether the relationship between political turmoil and firm growth varies across the different dimensions of social unrest (e.g. political violence, armed conflicts, mass civil protest, instability of the political regime, etc.). Second, in terms of quantity, we do not have firm-level data prior to the Arab spring, thus impeding us from using panel-econometric techniques

which would have enabled us to control for firm fixed effects and deal with any potential survivor bias.

Our findings have some policy implications. Traditionally, the challenge of firm growth is tackled through a technical and apolitical lens; however, our analysis provides evidence that when it comes to revolution-torn countries, policy makers should first and foremost shield the economy from destabilizing political and security events. More specifically, they should focus on reducing political instability in regions that were the most affected by it (e.g. the interior region in the case of Tunisia) through tackling its root causes such as high unemployment rates, regional disparities and income inequalities, which are argued to be the main reasons behind the uprisings in the interior region of Tunisia. According to El-Khawas (2012, p. 7), “unemployment was more than 22 percent in Kasserine and Gafsa in the interior, regions that were among the first to challenge the regime”.¹⁰⁵ In addition, Tunisian authorities are encouraged to develop policies aimed at targeting small and exporting firms as well as those that are operating in the tourism sector, as these are found to have been the most affected by political instability.

Finally, and while this study is focused on Tunisia, its findings may be relevant to other countries that experienced a long and protracted period of transition from one political regime to another. However, due to the geo-political, cultural and historical specificities of the Arab world, we recognize that political instability in this region is a complex issue which needs more research to understand its causes, dynamics and economic implications, particularly following the Arab Spring uprisings.

¹⁰⁵ “Regional disparities were very large: (i) average poverty rates remained 3 times as high in the interior of the country than in richer coastal “offshore” areas; (ii) at 25 percent, unemployment rates in the interior regions were double those of coastal areas; and (iii) only 13 percent of foreign firms were created in the interior regions.” (IMF, 2015, p. 22).

Appendices to Chapter 3

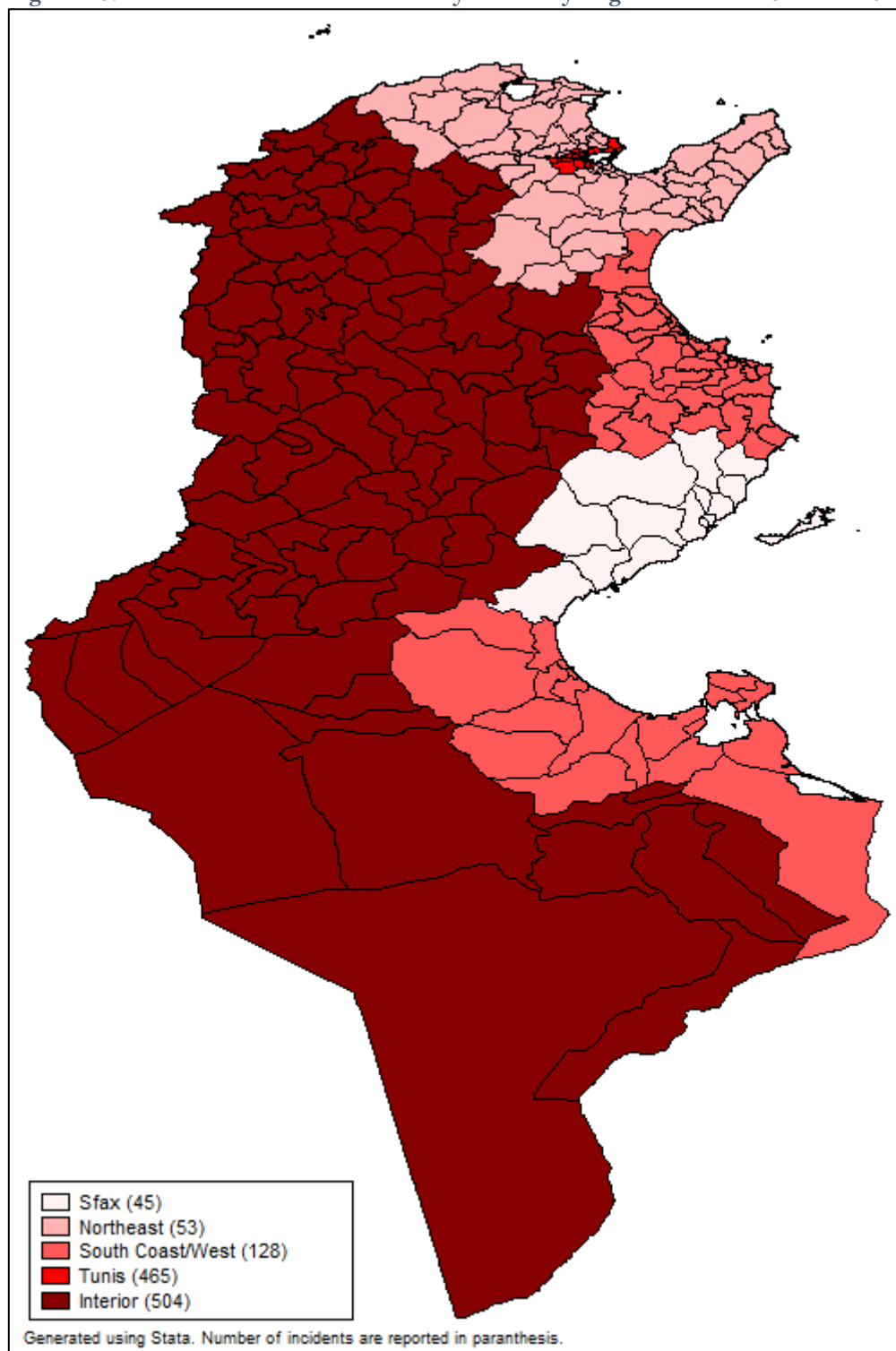
A – Description of the ACLED Database

ACLED is a conflict dataset that was launched by Raleigh et al. (2010) to provide disaggregated data about conflicts in more than 60 countries located particularly in Africa and Asia. In its fifth version,¹⁰⁶ the ACLED database reports different kind of conflict events, based on articles and reports from the humanitarian agencies, the media, and other research publications. It contains detailed information regarding the date and location (including detailed GPS coordinates such as longitude and latitude) of each conflict event. In addition, it includes the number of fatalities that resulted from each event as well as the parties involved in it. Most importantly, this database includes five different kinds of conflicts in the Tunisian case, which according to Raleigh and Dowd (2015) are defined as follows:

- Battle won by defender: “A battle between two violent armed groups where control of the contested location does not change”.
- Non-violent activity: “This category is designed to capture events that are important within a state’s political history, and may be triggers of future events, but are not directly violent”
- Remote violence: “Remote violence refers to events in which the tool for engaging in conflict did not require the physical presence of the perpetrator.”
- Violence against civilians: “Violence against civilians occurs when any armed/violent group attacks civilians”.
- Protests/Riots: “A protest describes a non-violent, group public demonstration, often against a government institution. Rioting is a violent form of demonstration”.

¹⁰⁶ Version 5 of the ACLED database includes conflict data from 1997 till 2014.

Figure A3.1: Number of Political Instability Events by Region Between 2011 and 2014



Source: Author's own calculations based on the ACLED database.

B – Additional Tables

Table B3.1: List of Firm Characteristics and the Corresponding Coding

Variable	Category	Code
Firm Size	Small: 5 to 19 employees	1
	Medium: 20 to 99 employees	2
	Large: more than 100 employees	3
Firm Age	Number of years in operation since firm creation	Continuous variable
Export Activity	Less than 10 percent of sales are direct exports	0
	More than 10 percent of sales are direct exports	1
Foreign Owned	Less than 50 percent of the company is owned by a foreign entity	0
	At least 50 percent of the company is owned by a foreign entity	1
Manager's Experience	Manager's years of experience	Continuous variable
Manager's Gender	Female	1
	Male	2
Manager's Education Level	Completed Primary school	1
	Preparatory or Incomplete Secondary school	2
	Completed Secondary school including Vocational	3
	University degree or higher	4
Subsidy	This establishment did not receive any subsidies	0
	This establishment received any subsidies	1

Source: TES database and author's own coding.

Table B3.2: Summary statistics of firm characteristics

Variable	Obs	Mean	Std. Dev.	Min	Max
Size	569	1.87	0.76	1	3
Manag Exp	561	25.75	11.41	1	63
Manag Gend	569	1.93	0.26	1	2
Subsidy	566	0.16	0.37	0	1
Foreign	569	0.10	0.30	0	1
Age	567	22.81	14.12	1	108
Manag Educ	567	3.67	0.58	1	4
Exporter	569	0.39	0.49	0	1
Sales Growth	535	0.26	38.49	-66	164

Source: TES database and author's own coding.

Table B3.3: Business Environment Obstacles Averaged Across Firm Characteristic

	Total Sample	Size ^a			Age ^b				Exporting Activity ^c		Manager's Experience ^d			
		Small	Medium	Large	Very Young	Young	Old	Very Old	Non- Exporter	Exporter	Little	Medium	High	A lot
Acc Fina	1.12	1.38	1.04	0.85	1.72	1.11	1.09	1.00	1.08	1.18	1.31	1.24	1.10	0.98
Acc Land	0.41	0.48	0.37	0.40	0.59	0.47	0.31	0.40	0.35	0.52	0.56	0.48	0.40	0.33
Licen and Perm	0.38	0.36	0.40	0.40	0.72	0.31	0.42	0.35	0.41	0.35	0.50	0.36	0.38	0.42
Corrup	1.80	1.92	1.80	1.62	1.72	1.84	1.88	1.50	1.77	1.86	2.50	1.93	1.81	1.49
Courts	0.38	0.41	0.38	0.33	0.53	0.43	0.26	0.41	0.41	0.34	0.75	0.44	0.34	0.34
Crime	0.57	0.64	0.56	0.48	0.66	0.54	0.56	0.66	0.54	0.62	0.81	0.55	0.52	0.70
Cust and Trd Reg	0.58	0.53	0.65	0.54	1.13	0.57	0.64	0.38	0.53	0.67	0.63	0.72	0.58	0.35
Inadeq Workfor	1.61	1.50	1.65	1.72	1.50	1.62	1.67	1.57	1.60	1.62	2.06	1.69	1.73	1.19
Labor Regul	0.57	0.49	0.65	0.53	0.69	0.57	0.51	0.63	0.53	0.62	1.06	0.49	0.61	0.52
Pol Inst	2.44	2.66	2.34	2.25	2.34	2.50	2.47	2.21	2.41	2.48	2.75	2.63	2.36	2.22
Reg Policy Uncert	0.95	0.95	1.06	0.75	1.06	0.96	0.87	1.00	0.90	1.02	1.00	0.93	0.93	1.00
Informal Compet	1.28	1.52	1.32	0.80	0.94	1.18	1.30	1.57	1.41	1.08	0.69	1.23	1.27	1.45
Tax Admin	1.00	1.09	0.99	0.87	1.16	0.95	1.03	1.08	1.03	0.96	0.69	1.02	0.98	1.09
Tax Rates	1.11	1.16	1.13	1.00	1.26	1.09	1.07	1.26	1.15	1.05	1.27	1.16	1.05	1.15
Elec	0.54	0.54	0.52	0.57	0.78	0.50	0.57	0.51	0.44	0.69	0.69	0.63	0.49	0.48
Telecom	0.41	0.43	0.37	0.43	0.56	0.40	0.46	0.33	0.36	0.48	0.69	0.48	0.33	0.38
Transp	0.54	0.57	0.51	0.54	0.66	0.51	0.58	0.54	0.53	0.54	0.88	0.58	0.51	0.49
Observations	569	205	235	129	32	255	171	92	346	223	16	196	233	116

Source: Author's own calculations based on the TES data. Note: ^aA firm is considered *Small* if it employs 5 to 19 employees, *Medium* if it employs 20 to 99 employees and *Large* if it employs at least 100 employees. ^bA firm is considered *Very Young* if it has been established 0 to 5 years prior to 2013, *Young* if it has been established 6 to 20 years prior to 2013, *Old* if it has been established 21 to 35 years prior to 2013 and *Very Old* if it has been established more than 36 years prior to 2013. ^cA firm is considered a *Non-Exporter* if it exports less than 10 percent of its sales, an *Exporter* if it exports more than 10 percent of its sales. ^dA firm manager is classified as having *Little* experience if he has 0 to 5 years of work experience, *Medium* experience if he has 6 to 20 years of work experience, *High* experience if he has 21 to 35 years of work experience and *A lot* of experience if he has more than 36 years of work experience.

Table B3.3: (Continued) Business Environment Obstacles Averaged Across Firm Characteristic

	Manager's Gender		Manager's Education				Region					Sector		
	Female	Male	Prim School	Prep School	Second School	Univ or Higher	Tunis	Sfax	Northeast	Coast/ West	Interior	Manuf	Retail	Services
Acc Fina	1.67	1.08	1.40	1.22	1.07	1.13	0.91	1.12	1.23	1.02	1.73	1.07	1.25	1.17
Acc Land	0.45	0.41	0.00	0.78	0.37	0.42	0.30	0.34	0.46	0.46	0.63	0.49	0.28	0.33
Licen and Perm	0.52	0.37	0.80	0.39	0.36	0.38	0.37	0.60	0.32	0.29	0.35	0.38	0.44	0.37
Corrup	2.14	1.78	2.40	1.67	1.76	1.81	1.66	1.82	1.77	1.84	2.15	1.69	2.28	1.83
Courts	0.38	0.38	0.20	0.56	0.33	0.39	0.51	0.32	0.36	0.30	0.53	0.38	0.52	0.34
Crime	0.93	0.54	1.40	0.50	0.52	0.58	0.46	0.55	0.56	0.54	1.13	0.54	0.74	0.57
Cust and Trd Reg	0.69	0.57	0.60	0.22	0.45	0.64	0.85	0.55	0.74	0.24	0.50	0.54	0.62	0.63
Inadeq Workfor	1.93	1.59	2.20	1.33	1.43	1.68	1.45	1.31	1.71	1.76	2.08	1.69	1.66	1.47
Labor Regul	0.74	0.55	0.20	0.83	0.44	0.60	0.48	0.75	0.58	0.41	0.72	0.61	0.62	0.47
Pol Inst	2.69	2.42	2.00	2.22	2.46	2.45	2.31	2.31	2.48	2.45	3.00	2.28	2.59	2.65
Reg Policy Uncert	0.98	0.95	1.40	1.17	0.90	0.95	0.82	1.47	0.80	0.71	1.18	0.97	1.05	0.88
Informal Compet	1.33	1.27	2.00	1.28	1.58	1.17	1.08	1.66	1.24	1.20	1.13	1.21	1.70	1.26
Tax Admin	1.38	0.97	1.60	0.72	1.04	0.99	0.94	1.07	1.01	0.91	1.23	0.92	1.23	1.06
Tax Rates	1.39	1.09	1.60	0.44	1.29	1.08	1.05	1.20	1.10	1.04	1.33	1.01	1.23	1.24
Elec	0.81	0.52	1.00	0.72	0.34	0.59	0.50	0.29	0.80	0.49	0.63	0.61	0.44	0.44
Telecom	0.83	0.37	1.20	0.06	0.22	0.47	0.39	0.36	0.60	0.26	0.40	0.43	0.41	0.37
Transp	0.90	0.51	1.20	0.50	0.43	0.56	0.52	0.54	0.60	0.41	0.78	0.53	0.46	0.56
Observations	42	527	5	18	134	410	119	121	149	140	40	318	61	190

Source: Author's own calculations based on the TES data.

Table B3.4: Definition of the Objective Variables Corresponding to the Subjective Measures

Subjective Measure	Objective Variable	Definition of the Objective Measure
Access to Finance	Why the firm did not apply for a loan? (1: no need for a loan / 2: financing constraints)	Referring again to the last fiscal year 2012, what was the main reason why this establishment did not apply for any line of credit or loan? (i) No need for a loan -establishment had sufficient capital; (ii) Application procedures were complex; (iii) Interest rates were not favorable; (iv) Collateral requirements were too high; (v) Size of loan and maturity were insufficient; Did not think it would be approved or (vi) other.
Access to Land	Percentage of Land not owned by firm (%)	Of the land occupied by this establishment, what percent is not owned by this establishment (i.e. Rented, leased or other)
Corruption	Informal payment to public officials (% of sales)	On average, what percentage of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?
Crime	Losses as a result of crime in 2012 (% of sales)	In fiscal year 2012, what were the estimated losses as a result of theft, robbery, vandalism or arson that occurred on this establishment's premises either as a percentage of total annual sales losses?
Customs and Trade Regulation	Number of days to obtain an import license	Approximately how many days did it take to obtain this import license from the day of the application to the day it was granted?
Inadequately Educated Workforce	Did this establishment have formal training programs for his employees in 2012? (yes/no)	Over fiscal year 2012, did this establishment have formal training programs for its permanent, full-time employees?
Practices of Competitors in the Informal Sector	Does this establishment compete against unregistered or informal firms? (yes/no)	Does this establishment compete against unregistered or informal firms?
Electricity	Number of power outages in a typical month	In a typical month, over fiscal year 2012, how many power outages did this establishment experience?
Telecommunications	Does the firm use of cell phones? (yes/no)	Does this establishment currently use cell phones for the operations of the establishment?

Source: TES database.

Table B3.5: Ordered Probit Models of Subjective and Objective Measures

Dependant Variable →	Access to finance	Access to land	Corruption	Crime	Customs and trade regulation	Inadequately educated workforce	Practices of competitors in the informal sector	Electricity	Telecommuni- cations
Why the firm did not apply for a loan? (1: no need for a loan / 2: financing constraints)	1.417*** (0.144)								
Percentage of Land not owned by firm (%)		0.002* (0.001)							
Informal payment to public officials (% of sales)			0.039*** (0.006)						
Losses as a result of crime in 2012 (% of sales)				0.179*** (0.054)					
Number of days to obtain an import license					0.007 (0.005)				
Did this establishment have formal training programs for his employees in 2012?						0.169* (0.097)			
Does this establishment compete against unregistered or informal firms? (yes/no)							2.212*** (0.129)		
Number of power outages in a typical month								0.144*** (0.045)	
Does the firm use of cell phones? (yes/no)									0.660*** (0.221)
Observations	321	569	397	567	134	569	565	565	569
Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author's own calculations based on the TES database. Notes: In each individual regression, the dependent variable is a categorical variable that ranges from 0 (no obstacle) to 4 (very severe obstacle) representing firm i's perception towards a certain issue as a business environment obstacle. Robust standard errors in parentheses and *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Table B3.6: Correlation Matrix of Variables

	Pol Obst	Size	Age	Exporter	Foreign	Manag Exp	Manag Gend	Manag Educ	Subsidy	Food	Garment	Other Manuf	Retail	Other Serv	Tourism
Pol Obst	1.000														
Size	-0.131***	1.000													
Age	-0.079*	0.174***	1.000												
Exporter	0.021	0.321***	-0.053	1.000											
Foreign	-0.028	0.178***	-0.139***	0.298***	1.000										
Manag Exp	-0.132***	0.022	0.304***	-0.028	-0.104**	1.000									
Manag Gend	-0.052	0.052	0.005	-0.078*	-0.045	0.079*	1.000								
Manag Educ	0.029	0.068	-0.000	-0.040	0.086**	-0.135***	-0.073*	1.000							
Subsidy	-0.043	0.233***	0.023	0.140***	0.084**	-0.027	-0.012	0.042	1.000						
Food	-0.113***	0.136***	0.114***	0.051	-0.083*	-0.012	0.066	0.013	0.130***	1.000					
Garment	-0.006	0.188***	-0.065	0.276***	0.260***	0.013	-0.049	-0.095**	0.012	-0.208***	1.000				
Other Manuf	-0.051	0.009	-0.046	0.045	-0.011	-0.077*	-0.011	0.039	0.140***	-0.227***	-0.243***	1.000			
Retail	-0.017	-0.106**	0.070	-0.190***	-0.083*	0.144***	0.008	0.023	-0.119***	-0.210***	-0.226***	-0.246***	1.000		
Other Serv	0.115***	-0.198***	-0.074*	-0.161***	-0.113***	-0.062	0.005	0.036	-0.137***	-0.225***	-0.242***	-0.263***	-0.245***	1.000	
Tourism	0.112***	-0.023	0.022	-0.021	0.056	-0.002	-0.028	-0.034	-0.036	-0.104**	-0.111***	-0.121***	-0.112***	-0.120***	1.000

*, **, *** indicate significance levels of 10%, 5%, and 1%, respectively.

Table B3.7: General-to-Specific OLS regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Acc Fina	-4.449*** (1.350)	-4.441*** (1.360)	-4.386*** (1.374)	-4.058*** (1.378)	-3.701*** (1.335)	-3.642*** (1.333)	-3.549*** (1.330)	-3.485*** (1.312)	-3.467*** (1.310)	-3.416** (1.321)	-3.415** (1.321)	-3.422*** (1.323)	-3.475*** (1.288)	-3.586*** (1.273)
Acc Land	-1.967 (2.018)	-1.817 (2.023)	-1.783 (2.017)	-1.410 (2.014)	-1.360 (2.045)	-1.055 (2.032)	-1.135 (2.051)	-1.174 (2.055)	-1.005 (2.034)	-0.807 (2.014)	-0.785 (2.016)	-0.798 (2.009)	-0.820 (2.007)	
Licen and Perm	-1.296 (2.484)	-0.720 (2.541)	-0.655 (2.556)	-0.769 (2.462)	0.086 (2.437)	0.319 (2.481)	0.323 (2.475)	0.340 (2.468)	0.425 (2.450)	0.899 (2.514)				
Corrup	1.454 (1.507)	2.159 (1.490)	2.418 (1.504)	2.406 (1.516)	2.342 (1.512)	2.276 (1.516)								
Courts	0.266 (2.539)	0.575 (2.585)	0.508 (2.563)	0.419 (2.548)	1.138 (2.580)	1.506 (2.530)	1.595 (2.526)	1.625 (2.519)						
Crime	0.443 (2.206)	0.057 (2.259)	0.249 (2.234)	0.312 (2.217)	0.674 (2.232)	0.980 (2.231)	1.124 (2.231)	1.239 (2.172)	1.391 (2.142)					
Cust and Trd Reg	5.901*** (1.896)													
Inadeq Workfor	-0.682 (1.381)	-0.399 (1.348)	-0.360 (1.342)	-0.246 (1.341)	0.101 (1.388)	0.107 (1.386)	0.866 (1.355)							
Labor Regul	3.584* (2.173)	3.633 (2.251)	4.118* (2.213)	4.184* (2.210)										
Pol Inst	-6.177*** (1.658)	-6.635*** (1.657)	-6.582*** (1.653)	-6.107*** (1.628)	-6.048*** (1.653)	-5.865*** (1.655)	-4.686*** (1.506)	-4.508*** (1.495)	-4.473*** (1.499)	-4.295*** (1.459)	-4.248*** (1.444)	-4.261*** (1.416)	-4.297*** (1.390)	-4.317*** (1.387)
Reg Policy Uncert	-3.059* (1.822)	-2.553 (1.835)	-2.474 (1.826)	-2.116 (1.793)	-1.116 (1.744)	-1.070 (1.754)	-0.790 (1.768)	-0.956 (1.719)	-0.625 (1.649)	-0.251 (1.588)	-0.093 (1.542)			
Informal Compet	0.693 (1.239)	1.113 (1.235)	0.905 (1.232)	0.930 (1.243)	0.815 (1.214)	0.708 (1.223)	0.757 (1.222)	0.787 (1.216)	0.821 (1.217)					
Tax Admin	-4.362* (2.288)	-4.478* (2.315)	-4.698** (2.288)	-1.084 (1.644)	-0.766 (1.633)	-0.937 (1.641)	-0.707 (1.620)	-0.637 (1.634)	-0.598 (1.634)	-0.428 (1.594)	-0.292 (1.516)	-0.307 (1.506)		
Tax Rates	4.561** (2.293)	4.766** (2.297)	5.062** (2.270)											
Elec	-1.050 (1.678)	-0.484 (1.686)	0.149 (1.711)	0.277 (1.729)	2.074 (1.473)									
Telecom	3.470 (2.583)	3.804 (2.659)	4.468* (2.509)	4.039 (2.548)										
Transp	2.233 (2.020)	3.429 (2.096)												
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	518	518	518	519	519	519	519	519	519	520	520	520	520	520

Notes: Robust standard errors in parentheses. *, **, *** indicate significance levels of 10%, 5%, and 1%, respectively. The dependent variable is the real firm sales growth rate between 2009 and 2012. In all regressions the set of firm characteristics includes: the firm age (and age squared), its export activity, its legal status, whether its foreign owned, the percentage of the firm owned by the government, and the manager's years of experience, his/her education level and gender.

Table B3.8: First-Stage IV Results

	Panel A		Panel B	
	(1)	(2)	(3)	(4)
	Access to Finance	Political Instability	Access to Finance	Political Instability
Access to Finance (Average)	0.968*** (0.079)		0.963*** (0.104)	
Political Instability (Average)		1.014*** (0.076)		1.001*** (0.077)
Access to Finance Objective Measure (Average)			0.054 (0.214)	
Losses as a result of crime in 2012 (% of sales)				0.040*** (0.010)
Additional Controls	Yes	Yes	Yes	Yes
Observations	520	520	499	519

Note: Robust standard errors in parentheses. *, **, *** indicate significance levels of 10%, 5%, and 1%, respectively. In each regression the dependent variable is presented below the column number. In all regressions the set of firm characteristics includes: the firm age (and age squared), its export activity, its legal status, whether its foreign owned, the percentage of the firm owned by the government, and the manager's years of experience, his/her education level and gender. In panel A (B), we consider the first stage regressions of column 4 (5) of Table 3.2.

Table B3.9: Impact of Business Obstacles on Employment Growth

	OLS			IV	
	(1)	(2)	(3)	(4)	(5)
Acc Fina	0.250 (1.296)				
Acc Land	0.123 (2.216)				
Licen and Perm	0.320 (2.327)	-0.125 (2.343)			
Corrup	1.381 (1.701)				
Courts	-0.214 (2.332)	0.316 (2.240)			
Crime	-0.179 (1.680)	-0.580 (1.693)			
Cust and Trd Reg	1.656 (1.526)				
Inadeq Workfor	-2.917** (1.420)	-2.104* (1.267)	-2.129* (1.225)	0.891 (2.697)	0.787 (2.666)
Labor Regul	-0.793 (2.042)	-0.480 (2.012)			
Pol Inst	-5.805*** (1.744)	-4.591*** (1.424)	-4.530*** (1.322)	-10.067*** (2.601)	-9.915*** (2.600)
Reg Policy Uncert	-0.416 (1.815)	-0.017 (1.801)			
Informal Compet	-0.415 (1.175)	0.111 (1.198)			
Tax Admin	-1.614 (1.820)	-0.127 (1.384)			
Tax Rates	1.610 (1.816)				
Elec	-1.432 (1.817)	0.721 (1.915)			
Telecom	3.229* (1.875)				
Transp	-0.379 (1.537)	0.509 (1.554)			
Additional Controls	Yes	Yes	Yes	Yes	Yes
Observations	511	513	514	514	513
F-test (Inadequately Educated Workforce regression)				94.9	61.5
F-test (Political Instability regression)				74.9	49.7
Overidentification test (p-value)					0.87

Note: Robust standard errors in parentheses. *, **, *** indicate significance levels of 10%, 5%, and 1%, respectively. The dependent variable is the growth rate of full-time employees between 2009 and 2012. In all regressions the set of firm characteristics includes: the firm age (and age squared), its export activity, its legal status, whether its foreign owned, the percentage of the firm owned by the government, and the manager's years of experience, his/her education level and gender. The endogenous variables are the political instability and the inadequately educated workforce. In column, 4 the region-sector-size average of each endogenous variable is used as a respective instrument. In column 5, we add the percentage of annual sales resulting from crime events (vandalism, arson, etc.) as an instrument.

Table B3.10: Disaggregated Impact of Damaging Constraints on Sales Growth

	OLS	IV
	(1)	(2)
Acc Fin (Small Obstacle)	-7.393 (4.899)	-9.092 (12.058)
Acc Fin (Big Obstacle)	-10.666*** (3.600)	-24.150*** (8.180)
Pol Inst (Small Obstacle)	-4.991 (7.100)	-14.251 (17.659)
Pol Inst (Big Obstacle)	-16.858*** (5.168)	-34.055*** (11.670)
Additional Controls	Yes	Yes
Observations	520	519
F-test (in Small Access to Finance)		13.1
F-test (in Big Access to Finance)		34.3
F-test (in Small Political Instability)		11.2
F-test (in Big Political Instability)		29.5
Overidentification test (p-value)		0.85

Note: Robust standard errors in parentheses. *, **, *** indicate significance levels of 10%, 5%, and 1%, respectively. The dependent variable is the real firm sales growth rate between 2009 and 2012. In all regressions the set of firm characteristics includes: the firm age (and age squared), its export activity, its legal status, whether its foreign owned, the percentage of the firm owned by the government, and the manager's years of experience, his/her education level and gender. Small obstacle equals 1 if firm i considers issue X a minor constraint and Big Obstacle equals 1 if firm i considers issue X as moderate, major or very severe constraint.

Chapter 4 - Economic Impact of, and Recovery from Political Instability: Multi-Country Analysis using the Synthetic Control Method

4.1 Introduction

Following the Arab Spring in 2011, the bloodless coup in Thailand in 2014, and more recently the failed military coup in Turkey, there has been a resurgence of interest in examining political instability events among economists and political scientists. While scholars have extensively studied the causes and consequences of political instability, the issue of whether countries recover from political instability events remains largely unexamined. In this chapter, the Synthetic Control Methodology (SCM) is used to estimate the impact on output of political regime crises accompanied by mass civil protest (which are termed here as “mass political instability events”), up to a five-year horizon. The SCM is a suitable method that enables us to estimate the immediate and dynamic economic impact of political instability. This makes it possible to estimate not only the short-run effect, but also whether output recovers significantly over time on a country-by-country basis. Moreover, this chapter explores the reasons behind the observed differences in the speed at which economies recover from mass political turmoil.

The contribution of this chapter is threefold. First, it adds value to the literature that has studied the impact of political turmoil on macroeconomic outcomes (Aisen and Veiga, 2013; Alesina and Perotti, 1996; Barro, 1991; Carmignani, 2003; Jong-A-Pin, 2009) by focusing on political instability events that happened in conjunction with mass civil protest, as opposed to (i) armed conflicts which involve the destruction of physical capital and (ii) ethnic diversity that was found to be positively related to economic performance (Jong-A-Pin, 2009). Second, it derives a new measure of recovery using the synthetic control method which allows us to

estimate how an economy would have performed in the absence of political instability (counterfactual), thereby contributing to the existing research that examined recoveries following economic crises or large shocks (Cerra et al., 2013; Cerra and Saxena, 2005, 2008; Flores and Nooruddin, 2009; Hausmann et al., 2006; Hong and Tornell, 2005; Kang and Meernik, 2005; Roland, 2002). In contrast to earlier studies, our empirical approach enables us to disentangle the impact of instability during the event year and the subsequent periods. Moreover, counterfactuals constructed using SCM are more reliable than those previously used in the literature, such as linear trends and pre-shock levels, because they capture global economic changes that may have occurred in the post-instability period. Third, this chapter uses this recovery measure and investigates, for the first time, the determinants of economic recovery (or deterioration) following episodes of mass political turmoil.

The main results of this chapter are as follows. While events of mass political instability tend to have, on average, an immediate and permanent adverse impact on a country's per capita income, we find heterogeneous effects across countries, unlike earlier studies which focused on analysing the averaged treatment effect using panel econometric techniques. In particular, we classify countries' reaction to mass political turmoil according to the following categories: (i) no negative impact, (ii) initial adverse impact followed by a fast recovery, (iii) initial adverse impact followed by a slow recovery and (iv) initial adverse effect that is never recovered. Political regime crises not accompanied by mass civil protest are also examined, and are found to have negligible negative output effects. Furthermore, we find evidence that poorer countries and those which invest more, experience a faster economic recovery after periods of mass political turmoil. On the other hand, democratization is found to be inversely associated with recovery. These findings are robust to controlling for a wide range of explanatory variables as well as to omitting countries that were impacted by large

idiosyncratic shocks during the recovery period and others for which we could not obtain reliable counterfactuals prior to the event of mass political instability.

The remainder of this chapter is organized as follows. Section 4.2 starts by discussing how political instability has been measured by economists, then continues by reviewing the literature on the economic impact of political instability, and ends by covering the previous research that examined the determinants of economic recovery following large shocks. Section 4.3 presents theoretical and empirical arguments regarding which factors might be associated with recovery following political instability events, while section 4.4 discusses our definition of mass political instability events. This is followed by section 4.5 which describes the key trends in macro-economic indicators before, during and after such episodes. Subsequently, section 4.6 estimates the impact of mass political instability during the event year and the speed of recovery afterwards using the synthetic control method, while section 4.7 explores which country characteristics are associated with a faster economic recovery. Finally, section 4.8 concludes.

4.2 Literature Review

In this section, we start by discussing how political instability has been measured in the literature, then proceed by reviewing the previous research that examined the macroeconomic impact of political instability,¹⁰⁷ and finish by covering the emerging literature that explored the determinants of economic recovery following large shocks.

4.2.1 Measuring Political Instability

Political scientists have long argued that instability is a latent and multidimensional concept that reflects different events: institutional change, political violence, armed conflicts, civil

¹⁰⁷ Carmignani (2003) provides an extensive survey of the nexus between political instability and different macroeconomic variables.

protest, riots, instability of the political regime, among other things (Hibbs, 1973; Rummel, 1963; Tanter, 1966). As such, economists have defined and measured this construct somewhat differently. For instance, Aisen and Vega (2013, p. 151) defined episodes of political instability by periods in which a government changes, that is “a new premier is named and/or 50% or more of the cabinet posts are occupied by new ministers”. On the other hand, Fosu (2001) measured political instability events by successful, abortive and officially reported coups.¹⁰⁸ However, these two measures are likely to have a different impact on the economy as it is difficult to imagine, for instance, that the frequent cabinet changes in Jordan in the nineties¹⁰⁹ had the same economic effect as the 2011 Tunisian revolution that toppled the long entrenched political regime.

In his seminal paper on the determinants of growth, Barro (1991) used the number of coups and revolutions as well as the number of political assassinations per year to proxy for political instability. Particularly, he relied on the first version of the Cross-National Time Series (CNTS) database that was developed by Arthur Banks in 1979. This dataset, which later on became one of the most cited sources in the applied political economy literature,¹¹⁰ currently covers more than 200 countries from 1815 till 2014. For example, Easterly (2003) relied on this database to control for the number of assassinations when examining the effectiveness of foreign aid in spurring growth. In a different context, Woo (2003) used the following variables to explore the nexus between political instability and public sector deficits in a panel of 57 developing and developed countries between 1970 and 1990: major cabinet

¹⁰⁸ A list of the different political instability definitions is available in table 2 of Carmignani (2003).

¹⁰⁹ According to the 2002-2006 Country Strategy Paper (CSP) between the EU and Jordan published in 2001, “the average life span of Governments in Jordan since its independence is less than one year” (European Commission, 2001, p. 8).

¹¹⁰ For an extensive list of papers that have employed the CNTS database, kindly refer to the following webpage: <http://www.cntsdata.com/#!citations/c1tsl>.

changes, government crises, constitutional changes, changes in the executive, coup d'état, the number of assassinations, and the occurrence of revolutions.¹¹¹ Meanwhile, Campos and Karanasos (2008) investigated the relationship between political instability and growth volatility in Argentina over the period 1986-2000. They categorized political instability into two groups: formal and informal. The former included the number of legislative elections and constitutional changes, while the latter contained the number of assassinations and the number of general strikes with more than 1,000 individuals. In contrast, Aisen and Vega (2006) considered the number of cabinet changes and that of government crises as measures of political instability. All these individual measures, however, suffer from measurement error because they contain some, but not all the information about the true level of political turmoil.

Several attempts have been made to tackle the measurement error problem using Principal Component Analysis (PCA). In this approach, followed by Morrison and Stevenson (1971) and Perotti (1996), the aggregate level of political turmoil is quantified as a weighted average of different political instability indicators with the largest eigenvalues. A different methodology was adopted by Cukierman et al. (1992) and Alesina et al. (1996) who estimated the probability of a government change using probit models with various economic, institutional and political factors as explanatory variables. However, to the best of our knowledge, Jong-A-Pin (2009) has made the most comprehensive effort to address the

¹¹¹ These variables were explicitly grouped by Woo (2003) as measures of political instability. However, the author also focused on government fragmentation (or government weakness) variables, which were explicitly distinguished from those of political turmoil. More specifically, these variables were (i) the party fractionalization index, defined as the probability that two legislators belong to distinct political parties, (ii) the ratio of the parliament size relative to the number of seats dominated by the biggest party and (iii) the government size (the number of ministers) which relates to the notion of executive fragmentation that causes larger fiscal deficits because a higher number of ministers implies that “each will pay a smaller share of the revenue costs of each dollar of expenditure he or she proposes; the marginal cost of expenditure to each policymaker falls, and in equilibrium each will propose a higher expenditure. As a result, aggregate expenditure will also increase” (Kontopoulos & Perotti, 1999). However, it is also plausible to assume that the three variables represent an indirect form of political instability because they hinder the efficiency of the decision making process (Alesina and Drazen, 1991).

multidimensionality of political instability by applying an Exploratory Factor Analysis (EFA) to 25 measures of political turmoil previously used in the literature. He found that indicators of political instability can be distilled into four major categories: mass civil protest, politically motivated violence, instability of the political regime and instability within the regime.

4.2.2 The Economic Implications of Political Instability

Knowing how political instability affects economic activity has been a question of inherent interest for policy makers and researchers. As mentioned in section 4.2.1, Barro (1991) was the first to examine the relation between political instability and macroeconomic variables. He found that investment and growth are inversely related to political instability. In turn, Alesina and Perotti (1996), who developed a political instability index based on the number of coups and political assassinations, showed that political strife lowers the investment-to-GDP ratio using a sample of 71 countries averaged over the 1960-1985 period. This cross-section regression approach might, nevertheless, suffer from endogeneity stemming from omitted variable and simultaneity biases as “political and economic variables might be jointly determined in a system of simultaneous equations” (Carmignani, 2003, p. 23).

In addition to his main contribution of categorizing the various measures of political instability into the four groups mentioned in section 4.2.1, Jong-a-Pin (2009) examined the individual impact of each of these different dimensions on long-term economic growth (5-year period averages) using a system-GMM estimator on a panel of 90 countries over the period 1974-2003. He concluded that instability of the political regime reduces economic growth. In his view, this result may possibly reflect the increased uncertainty which might adversely impact investment and hamper economic growth. In contrast, the author found evidence that instability within the political regime increases growth. He argued that this finding was in line with Besley et al.’s (2005) model, which posits that additional political competition leads to more competent politicians who tend to implement better policies. Surprisingly, Jong-a-

Pin finds no significant impact of the politically motivated violence component (civil wars and guerilla warfare) on growth, which contrasts with Collier (1999), Hoeffler and Reynal-Querol (2003) and Bove et al. (2016), who all showed that civil wars lower economic growth. One possible reason for that, which the author highlighted, are missing observations for highly unstable countries.

Likewise, Aisen and Vega (2013) adopted a system-GMM model to examine the effect of political instability on GDP growth per capita. They measured political instability by the number of times in which a new prime minister is named and/or at least half of the government is reshuffled in the span of one year. Their main finding, based on a panel of 169 countries and 5-year period averages from 1960 to 2004, was that political instability negatively affects economic growth. Moreover, they examined, using a standard production function, three possible channels through which instability might impact growth: productivity, physical and human capital. They showed that the majority (between 56.3 to 64.2 percent) of the adverse impact of instability on growth was driven by the productivity channel. In a separate study, Bernal-Verdugo et al. (2013) focused on the dynamic effects of political turmoil on growth using a panel of 183 countries from 1980 to 2010. They found that instability has a significantly negative impact on growth during the first two years. However, impulse response functions suggested that this short-term adverse impact vanishes over the longer run.

In addition to its adverse impact on growth, the nexus between political instability and other economic variables has been extensively studied in the literature. For instance, Devereux and Wen (1998) used a linear endogenous growth model to study the impact of political instability on fiscal variables. They introduced political instability to their theoretical model by assuming that governments are constantly faced with a likelihood of losing power.

One of their main predictions is that political instability induces governments to engage in excessive spending, which, in turn, leads to higher debt-to-GDP ratios. With regard to inflation, Aisen and Vega (2006) showed, using a system-GMM estimation strategy applied to a panel dataset of 100 countries over the period 1960-1999, that political instability positively and significantly impacts inflation. Political turmoil has also been related to financial development. In particular, Roe and Siegel (2011) found, using an instrumental variable approach, that political instability significantly lowers financial development. Noteworthy, are studies that examined the link between political risk and currency markets. For example, Melvin and Tan (1996) found, after assessing the impact of political instability on the South African foreign exchange market, that social unrest caused larger bid-ask spreads. Furthermore, Crowley and Loviscek (2002) explored the effects of political instability on the foreign exchange markets in Brazil, Chile, Colombia, Mexico, Peru, and Venezuela between February 1991 and January 1999. They found, using daily data, that political turmoil led to a significant currency depreciation.¹¹² Finally, Fielding (2003) used a panel VAR model to estimate the elasticities of manufacturing employment and investment with regard to the conflict intensity in Northern Ireland between 1971 and 1996. He found that the intensity of the political conflict, measured by (i) the number of fatalities resulting from a politically motivated action and (ii) the number of deaths as a share of the number of reported violent events, had a significantly adverse impact on machinery and construction investment.

Recently, researchers have made use of the high degree of political instability that followed the 2011 Arab uprisings in order to analyse its impact on stock markets. Chau et al. (2014) adopted a GARCH methodology to examine the impact of the Arab Spring on stock market volatility in the MENA region. They found that the uprisings affected the volatility

¹¹² Brada et al. (2006) provides, in section 3 of his paper, a brief survey of the literature on the relation between political instability and different economic variables.

of stock market indices that are compliant with Islamic finance regulations. Moreover, Fakhfekh and Jarboui (2015) employed a Fractionally Integrated Exponential Generalized Autoregressive Conditional Heteroscedasticity (FIEGARCH) approach to examine the impact of the political strife that stemmed from the 2011 Tunisian revolution on the volatility of stock returns. They found evidence that political turbulence increased the volatilities of the industrial, construction and financial services indices permanently. Finally, Acemoglu et al. (2014) considered the Egyptian uprisings and found, using an event-study methodology, that the number of protests reduced the cumulative return of firms connected to the ruling party, but did not have a significant impact on companies linked to the rival groups.

4.2.3 Determinants of Economic Recovery after Shocks

In this sub-section, we briefly survey the emerging literature that explored the determinants of economic recovery following large shocks (or disruptive events) such as armed conflicts, currency crises and financial crises.

Flores and Nooruddin (2009) examined why certain economies recover faster than others in the aftermath of armed conflicts. They applied a duration analysis on a set of 164 conflict episodes out of which 100 have recovered, defined as the highest output level reached during the five years preceding a conflict. Their results suggest that following armed conflicts “small shifts toward democracy result in faster economic recovery, whereas larger shifts toward democracy (i.e., from autocracy) and shifts to intermediate regimes present special problems” (2009, p. 16). According to the authors, these findings support the theoretical expectations that sudden shifts towards democracy deter economic recovery as these unexpected transitions increase uncertainty and therefore depress economic recovery (Nicole, 1996; Walter, 1997). Meanwhile, Kang and Meernik (2005) used a 2SLS-IV estimation strategy to examine the determinants of post-conflict growth on a dataset composed of 70 armed conflicts spanned over the period 1960-2002. In contrast to the “phoenix factor” hypothesis, they found

that destructive wars negatively impact post-conflict recovery. Moreover, their results indicate that a higher initial income level, ethnic fractionalization and the inflation rate reduce post-conflict growth. On the other hand, they found evidence that more democratic countries, as well as those that have U.N. peacekeeping personnel, a higher population growth, export more and receive more foreign aid, tend to recover faster after the end of civil wars. Lastly, Elbadawi and Soto (2013) employed a system-GMM model to study the role of various exchange rate regimes in affecting economic growth following the end of conflicts. Their main finding, based on a panel of 132 countries (out of which 38 experienced civil wars) and 5-year period averages from 1970 to 2008, was that countries under fixed and managed exchange rate regimes grew faster than those that adopted a floating regime.

Regarding currency crises, Hong and Tornell (2005) explored the economic impact of such crises on a set of around 100 developing countries. They showed that income levels remain below their initial path that would have prevailed without the crisis. More importantly, they found, using regression analyses, that pre-crisis illiquidity and credit booms slow the pace of recovery in the aftermath of currency crises. The authors argued that pre-crisis illiquidity may induce a capital flow reversal after the crisis, hence deepening the recession, while lending booms increase the debt burden of firms prior to the crisis and consequently lead to a larger number of non-performing loans ex-post. In a related study, Cerra et al. (2013) examined whether macroeconomic policies impact the speed of recovery following recessions. They showed, using a fixed-effect model applied to a panel dataset of 197 countries between 1960 and 2005, that expansionary monetary and fiscal policies in addition to foreign aid inflows boost economic recovery following recessions.

4.3 Hypotheses and Empirics

Which countries recover faster than others following episodes of political instability? While there are no formal theories that answer this question, we focus on potential explanations premised on the existing literature presented in section 4.2.3.

We first refer to standard growth theories, such as the neoclassical (Solow, 1956) and endogenous growth (Romer, 1990) models, to get some theoretical insights. According to the former, countries with low levels of capital and therefore higher rates of return on investment tend to grow faster until they reach their steady state equilibrium whereby output, investment and labour all grow equally. In our context of political strife, investment usually drops significantly during the first year (Alesina and Perotti, 1996; Busse and Hefeker, 2007), implying that its rate of return increases and thus the economy should grow back rapidly over time. However, this prediction hinges on the assumption that human capital is relatively impacted less. More specifically, when human capital drops more than investment, the marginal product of the latter decreases, thus causing lower growth rates. Consequently, countries that experience a large brain drain as a result of political turmoil might find it harder to recover quickly. Meanwhile, endogenous growth models, which assume that technology is endogenous, predict that countries with higher productivity levels have a bigger capacity to absorb technical innovations and hence grow faster in the future. On the other hand, one might argue that countries with established institutions tend to have more structural rigidities, making them less responsive to macroeconomic shocks.¹¹³

¹¹³ “In comparison to the United States, Europe’s labour markets are described as institutionally rigid, extensively regulated, and unresponsive to economic pressures. This rigidity is regarded as an important cause of the comparatively higher wage growth in Europe, whereas the flexible U.S. labour market allows wages to adjust downward to economic shocks” (Ebbinghaus and Kittel, 2005, p. 164).

Furthermore, we believe that the identity of the ruling party argument, analysed by Kang and Meernik (2005), is relevant in our case. In particular, if the emerging government that comes to power following political turmoil works on removing the obstacles mounted under the previous administration, growth could be enhanced. For example, the new regime may be less corrupted by rents created by the old regime, hence allowing it to implement more reforms. Conversely, inexperienced leaders who do not have a clear economic reform agenda and are not trustworthy of local and international institutions may hamper growth prospects.

The government can also play a major role during the post-instability period through the policies it adopts in response to the shock. However, the main question is: what are the most appropriate policies for economic recovery? According to the standard conception, sound policies following a shock (financial crises, civil wars and currency crises), are those that “can influence the reaction to the shock” (Bleaney, 1996, p. 465) by restoring macroeconomic stability, thus reducing uncertainty which correlates negatively with the level of productivity and investment (Fischer, 1993).¹¹⁴ At the heart of such policies are fiscal consolidation, inflation and exchange rate stability.¹¹⁵ On the other side of the spectrum, several economists (Aghion et al., 2000; Cerra et al., 2013; Hong and Tornell, 2005; Yang et al., 2015) argue that, during times of fallen output and credit constraints, policy makers should opt for expansionary monetary and fiscal policies in order to stimulate the economy in the short run.

Economists also claim that ethnic or religious fragmentation induces political instability (Mauro, 1995) and indirectly lowers economic performance. As an example, Easterly and Levine (1997) found evidence that ethnic diversity negatively impacts growth as it impedes “agreement about the provision of public goods and create positive incentives for growth-

¹¹⁴ See Elbadawi and Soto (2013), Flores and Nooruddin (2009) and Kang and Meenik (2005).

¹¹⁵ Bleaney (1996) summarizes nicely how poor macro management impacts the economy.

reducing policies, such as financial repression and over-valued exchange rates, that create rents for the groups in power at the expense of society at large” (Easterly and Levine, 1997, p. 1206).¹¹⁶ In our context, we assume that highly heterogeneous communities (be they on the political, ethnic or religious levels) will become even more fragmented following political turmoil, thereby slowing down the pace of economic recovery.

Furthermore, political instability events lead to macroeconomic imbalances (see section 4.4) which the government needs to correct in order to prevent further deterioration in the economy. In such an environment, the regime-type hypothesis asserts that “authoritarian regimes are more likely than democratic regimes to stabilize rapidly” (Oatley, 2003, p. 288). The intuition is that in democracies with high levels of political polarization, different socioeconomic groups might have conflicting views on which policies should be adopted to stabilize the economy, resulting in a war of attrition that will lead to a political stalemate (Alesina and Drazen, 1991). This impasse will delay the stabilization process and consequently hinder the pace of economic recovery following political instability. Moreover, it is usually harder for democratic governments to implement costly stabilization policies (austerity measures and wage restrictions, among other things) that are strongly opposed by the public because these measures tend to affect their approval ratings and their chances of being re-elected in the future (Remmer, 1986).

Surprisingly, the literature has ignored the role that human capital might play in post-crises recoveries.¹¹⁷ As suggested by Gennaioli et al. (2013), entrepreneurship is a main channel through which education boosts economic activity. In particular, highly skilled

¹¹⁶ The negative impact of fractionalization on economic activity was further supported by (Alesina et al., 2003; Esteban et al., 2012; Montalvo and Marta, 2005).

¹¹⁷ The only exception are Elbadawi and Soto (2013) who added the rate of educational attainment as a control variable in their econometric model.

entrepreneurs tend to be innovative economic agents who are likely to find new ways of overcoming problems, hence boosting productivity, creating jobs and consequently helping the overall economy. Moreover, higher levels of education allow individuals to cope more efficiently with sudden changes in the economic environment. For instance, Schultz (1975) argued that more educated farmers are more successful during periods of disequilibria and changing economic environments.

In addition to the above local factors, we argue that external conditions can have a major influence on the domestic economy following social disorder. In fact, slower growth in the economy of a major trading partner may reduce the demand for home exports, lower FDI and tourism inflows, and consequently diminish the pace of economic recovery at home (Hong and Tornell, 2005). In addition, changes in the global commodity markets, such as the large drop in oil prices in mid-2014, are likely to impact domestic economies if they are major importers or exporters of these goods. We also consider the role of external aid which has a considerable effect in boosting growth following situations of political instability (Collier and Hoeffler, 2004a). Another global link that might positively impact the pace of economic recovery is trade openness, particularly through higher exports. As argued by Elbadawi and Soto (2013), trade affects growth by increasing productivity, expanding markets and spreading technological innovation, among other things.¹¹⁸ In particular, we posit that countries that are more open to trade can recover faster because they are more able to weather local shocks as the foreign markets, to which they export and from which they import, are unlikely to be largely impacted by the instability happening domestically.

¹¹⁸ In addition, Hausman et al. (2006) found that countries with a more diversified export portfolio tend to experience shorter crisis duration.

4.4 Determining Mass Political Instability Events

In contrast to armed conflicts and natural disasters, large-scale revolutions and coups, which were classified by Skaperdas et al. (2009, p. 11) as “lower-level internal conflicts”, are rarely accompanied by destruction of physical assets and large number of deaths or injuries. However, as shown in section 4.2.2, these political instability instances can also have large indirect costs resulting from the disruption of economic activity at the macroeconomic level.

In this chapter, the emphasis will be on events of mass political instability,¹¹⁹ which we define as episodes of political regime crises accompanied by mass civil protest.¹²⁰ As per Jong-a-Pin’s (2009) classification, discussed earlier in section 4.2.1 and presented in Table A4.1 of the appendix,¹²¹ the former category includes major government crises, major constitutional changes and coups d’état, while the latter contains large-scale riots, demonstrations and strikes.¹²² In essence, we define a country to have been impacted by a mass political instability event if, in any given year, it has been subjected to at least one political incident that falls under the mass civil protest category and, at the same time, witnessed at least one event that is classified as part of the political regime instability dimension.¹²³ We focus on instances

¹¹⁹ In the rest of this chapter we will use the words “instability”, “turmoil”, “upheaval” and “unrest” interchangeably.

¹²⁰ Jong-a-Pin’s (2009) initially termed political regime crises as instability of the political regime. In this chapter, we will use these two expressions interchangeably.

¹²¹ All tables and figures starting with an “A4” are available in the appendix of this chapter.

¹²² We did not include cabinet changes as part of the political regime crisis category because they do not necessarily represent instability, since they occur frequently as part of the normal political cycle. For instance, the standard government change variable includes “changes that do not involve substantial turnover of leadership” (Alesina et al., 1996, p. 193).

¹²³ For example, we consider Turkey to have experienced mass political turmoil in 2007 as protests in support of secularism coincided with a political crisis that manifested itself through a presidential vacuum after opposition parties blocked the ruling party’s presidential candidate in parliament causing a political deadlock which was only broken after calling for early general elections. In contrast, we do not identify the “walk-to-walk” protests that happened in Uganda during 2011 as a major political instability event as they did not destabilize the political regime.

when the two categories coincide because there are reasons to believe that such events are more economically damaging than when political regime crises happen unaccompanied by mass protest. In particular, mass civil protest impose additional economic constraints: the cost of production indirectly increases due to transportation disruptions, labour productivity falls due to missing labour, business meetings get delayed and the overall economy underperforms (Mas, 2008; Shonchoy and Tsubota, 2016).¹²⁴ Moreover, incidents of mass political instability are likely to have an adverse economic impact, albeit with a different order of magnitude compared to the other two categories of political turmoil: armed conflicts and ethnic diversity. According to Collier et al. (2003) and Skaperdas et al. (2009), wars are by far the costliest category as they involve the destruction of physical capital and impose large budgetary costs mainly due to increased military spending. In contrast, Jong-A-Pin (2009) found that ethnic diversity (fractionalization, polarization and number of elections in a given year) is positively related to economic activity.¹²⁵ In sum, we consider a mass political instability event to have occurred if the following two conditions, drawing on three different incidents,¹²⁶ are met:

- i) Mass civil protest: one (or more) of the following three indicators pass a threshold value: strikes, riots and demonstrations.
- ii) Instability of the political regime: in a given year there was a coup, a major constitutional change and/or a major government crisis.

¹²⁴ Jong-A-Pin (2009) also found that mass civil protest and instability of the political regime are positively and significantly correlated. Hence, it makes sense to group them together.

¹²⁵ Jong-A-Pin (2009) termed the ethnic diversity component as political instability within the political regime.

¹²⁶ Table A4.2 in the appendix defines each of these indicators.

To identify all these events that happened in the world between 1970 and 2014,¹²⁷ we use the 2015 Cross-National Time Series (Banks and Wilson (2015); hereinafter CNTS) database, a more recent version of the 2005 archive employed by Jong-A-Pin (2009). The CNTS dataset, which is extensively used in the applied political economy literature (see section 4.2.1), compiles political instability indicators based on the daily editions of the New York Times.¹²⁸

However, in certain cases, episodes of mass political instability were preceded by economic crises which tended to worsen macroeconomic performance irrespective of social unrest (e.g. Greece in 2011).¹²⁹ Hence, to accurately capture the economic impact of political instability and minimize potential biases we exclude these episodes. In addition, we omit cases of political turmoil which occurred in the midst of large-scale armed conflicts and/or were followed by natural disasters (floods, earthquakes, hurricane) as it is difficult to disentangle the adverse economic effects of mass political instability from those inflicted by large non-economic exogenous shocks (e.g. Guatemala in 2009). Overall, we exclude a total of 16 episodes listed in Table A4.3 in the appendix. Therefore, our final set of mass political instability episodes consists of 30 events shown in Table 4.1 below.¹³⁰

¹²⁷ We start from 1970 in order to allow for at least 10 years prior to any political instability event in order to construct a robust counterfactual for each country that was affected by mass political turmoil. More details regarding the construction of counterfactuals will be presented in section 4.3.

¹²⁸ To ensure that the political instability events identified using the CNTS database are accurate, we cross-checked using information from international institutions (IMF and World Bank) and news outlets (BBC and CNN), among others.

¹²⁹ “Recent images of massive demonstrations in Greece following the financial disruptions there illustrate that disruptions in national finance can disrupt political stability” (Roe and Siegel, 2011, p. 297).

¹³⁰ Figure A4.1 in the appendix shows that mass political instability events happened in different regions and over different time periods.

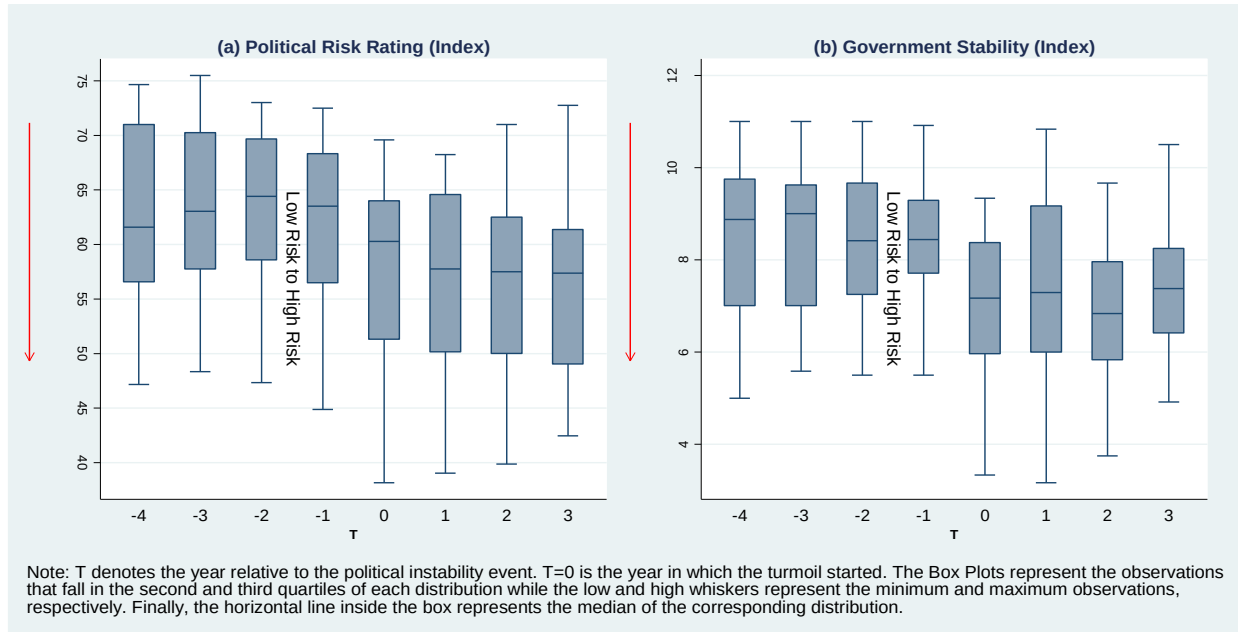
Table 4.1: List of Mass Political Instability Events

Country	Year*	Event	Mass Civil Protests			Instability of the Political Regime		
			Riots	Strikes	Demonstrations	Gov. Crisis	Const. Changes	Coup
Albania	1997	The government resigned after violent protests	yes	no	yes	yes	no	no
Bahrain	2011	Uprisings against the regime	yes	no	yes	yes	no	no
Bolivia	2003	The president resigned after weeks of violent protests	yes	yes	yes	yes	no	no
Chile	1973	The president was overthrown by a military coup	yes	yes	yes	yes	yes	yes
Egypt	2011	The president was ousted as part of the Arab Spring uprisings	yes	yes	yes	yes	yes	yes
Fiji	2005	A group of armed men invaded the parliament	no	no	yes	yes	yes	yes
Georgia	2003	The president was overthrown following the rose revolution	yes	no	yes	yes	yes	yes
Guinea	2007	Violent protests followed by a military coup	yes	yes	yes	yes	no	no
Haiti	2004	The president was forced out of power	yes	yes	yes	yes	no	yes
Honduras	2009	President was ousted in a Coup	no	no	yes	no	no	yes
Iran, Islamic Rep.	2009	Green revolution	yes	no	yes	yes	no	no
Italy	1992	Corruption scandal which dominated political parties	no	yes	yes	yes	no	no
Jordan	2011	The government was replaced following demonstrations	yes	no	yes	yes	yes	no
Kenya	1997	Nationwide protests demanding democratic reforms	yes	yes	yes	yes	no	no
Kyrgyz Republic	2005	The first tulip revolution	no	no	yes	yes	yes	no
Morocco	2011	Constitutional reform following protests	yes	no	yes	no	yes	no
Myanmar**	1988	The 8-8-88 movement that called for a transition to democracy	yes	yes	yes	yes	yes	yes
Nigeria	1993	General Abacha takes over power by a military coup	yes	yes	yes	yes	yes	yes
Pakistan	1999	The army ousted the civilian president	yes	yes	yes	yes	yes	yes
Paraguay	1999	President resigned following impeachment proceedings	yes	no	yes	yes	no	no
Peru	2000	President resigned following political and financial scandals	yes	yes	yes	yes	no	no
Philippines	1984	The Yellow revolution	yes	no	yes	no	yes	no
Portugal	1975	The Carnation Revolution	yes	yes	no	yes	yes	yes
Spain	1978	Change of political regime to a parliamentary monarchy	yes	no	yes	no	yes	no
Thailand	2006	The army ousted the president following protests	no	no	yes	no	yes	yes
Togo	2005	Political crisis following the president's death	yes	no	yes	yes	no	no
Tunisia	2011	The Jasmine revolution	yes	yes	yes	yes	yes	no
Turkey	2007	Clash between seculars and islamists and fears of political coup	no	no	yes	yes	no	no
Ukraine	2005	The Orange revolution that lead to a new government	no	no	yes	yes	no	no
Yemen, Rep.	2011	Yemeni revolution as part of the Arab Spring	yes	yes	yes	yes	no	no

* Political instability starting dates are taken from the CNTS database and cross-checked with online news sources. ** Myanmar was called Burma in 1988.

We expect that the longer it takes for a political system to stabilize after an initial instability event, the slower the pace of economic recovery will be. In order to examine whether political systems in our sample of countries stabilize after the initial shock, we rely on the Political Risk Rating (PRR) and Government Stability (GS) indices, both drawn from the International Country Risk Guide (ICRG). Figure 4.1(a) illustrates that the median political risk tends to increase further during the recovery period ($T \geq 1$), while Figure 4.1(b) shows that governments do not become more stable. Therefore, both figures suggest that the instability stemming from political unrest is likely to be permanent.

Figure 4.1: Distribution of Political Instability Indicators over Time*



Note: The political Risk Rating ranges from 0 (highest risk) to 100 (lowest risk). The Government Stability Index measures a government's ability to carry out its declared program(s), and its ability to stay in office. A score of 12 indicates a very low risk, while a score of 0 suggests a very high risk. * Note that the ICRG data starts from 1984, hence the following countries were omitted from the sample: Chile (1973), the Philippines (1984), Portugal (1975), Spain (1978). Moreover, Fiji (2005), Georgia (2003) and Kyrgyz Republic (2005) were excluded because ICRG data were not available for the corresponding period.

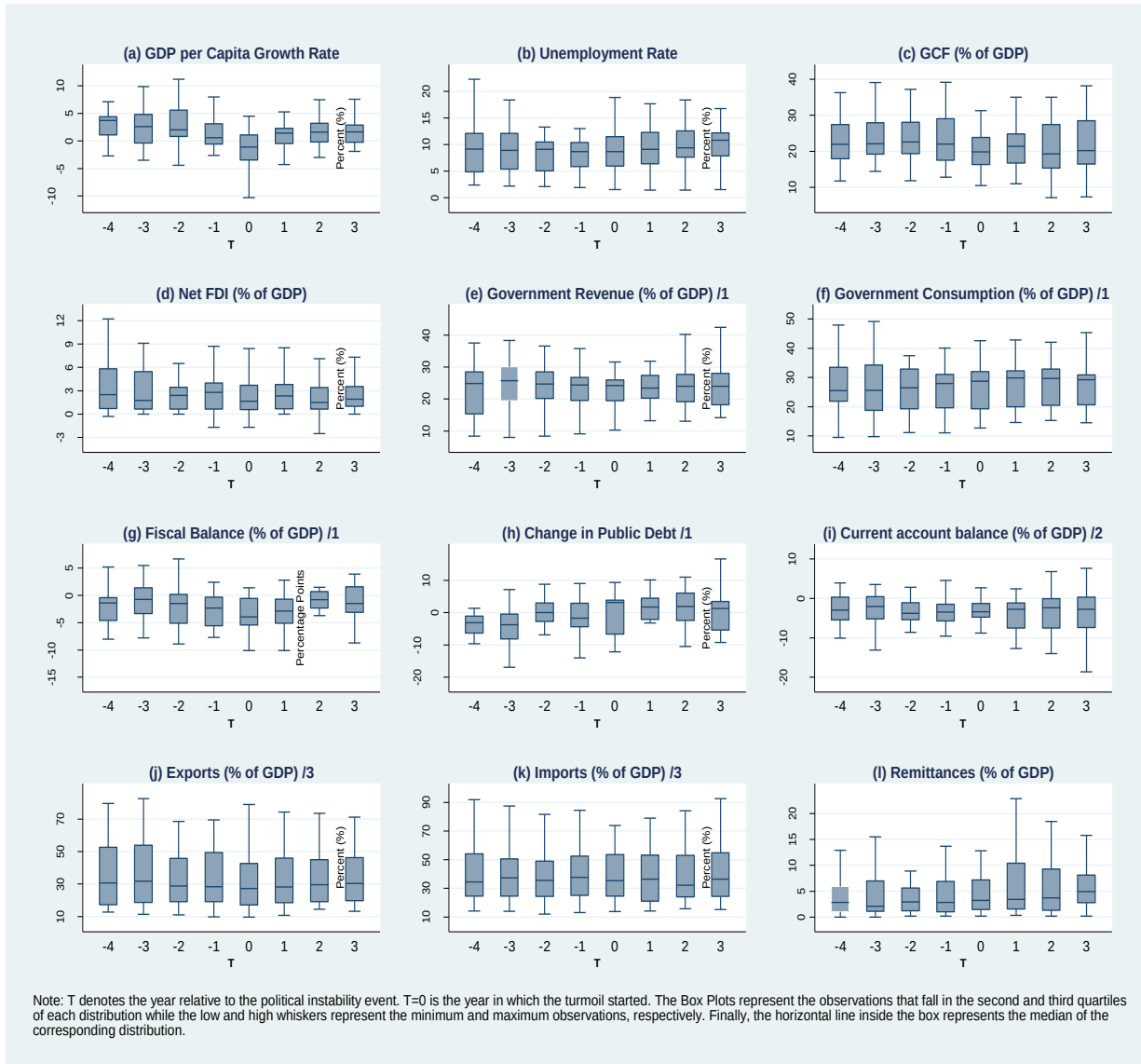
4.5 Preliminary Data Analysis

In this section, we examine the trends in key macro-economic indicators, before, during and after episodes of mass political unrest using a simple empirical strategy similar to Rasmussen (2004).

In order to generalize the concept of “before” and “after”, we create a variable T which represents the year relative to the mass political instability event. In particular, we define the event date to

be the year in which the turmoil started ($T = 0$). Figure 4.2 illustrates the dynamics of several macro indicators for the 30 countries that experienced mass political upheaval.

Figure 4.2: Distribution of Main Macroeconomic Variables over Time



Source: IMF's World Economic Outlook (WEO), World Bank's World Development Indicators (WDI) and author's own calculations. Notes: /1 Albania (1997), Peru (2000) and Spain (1978) are excluded because fiscal data were not available for the corresponding dates. /2 Portugal (1974) and Togo (2005) are excluded because current account data were not available for the corresponding dates. /3 Yemen (2011) is excluded because trade data were not available for the corresponding date.

Figure 4.2(a) indicates that mass political instability events are costly: they are associated with an immediate and large contraction in output in the event year, reflected by a 1.7 percentage point (pp) drop in the median per capita GDP growth. In subsequent years, the median per capita growth returns to its pre-unrest levels, though without surpassing it. Likewise, Figure 4.2(b) shows that the unemployment rate tends to gradually rise following mass political instability. In

these circumstances, and as illustrated in Figure 4.2(c), total investment also falls significantly possibly due to a decrease in investors' confidence resulting from an increase in policy uncertainty levels (Rodrik, 1991).¹³¹ The overall drop in investment is coupled with a fall in net foreign direct investment (FDI) as illustrated in Figure 4.2(d). This finding, which is in line with Brada et al. (2006) and Busse and Kefeker (2007), may have been driven by the following factors, among others. First, political hazard increases the threat of opportunistic expropriation behavior by host governments (Henisz, 2000), thus pushing multinational firms to reconsider their investment strategies. Second, political instability is likely to lead to a currency depreciation (Fielding and Shortland, 2005), which in turn reduces the value of firm assets and their expected profits generated by future investment. Third, due to risk aversion and high levels of mobility, foreign investors tend to react quite sharply to political turmoil and redirect their investments towards more secure places.

The adverse impact on governments' accounts is even clearer in the short run, with the median fiscal deficit widening by 1.5 pp of GDP during the first year of turmoil as illustrated in Figure 4.2(g). The worsening fiscal balances, which are driven by a combination of higher spending and lower revenues as shown in Figure 4.2(e) and Figure 4.2(f), respectively, lead to an increase in debt-to-GDP ratios as illustrated in Figure 4.2(h). Nevertheless, in the long run, the economic recovery translates into higher revenues. This is associated with a decrease in expenditures which pushes the fiscal balance to return to its pre-crisis level three years after the start of mass political instability. However, the median change in debt-to-GDP ratio maintains its upward trend, albeit at a slower pace.

¹³¹ "Major political upheaval, social unrest and revolutions are a major disincentive to invest" (Darby et al., p. 153). In particular, "political instability may serve to reduce the availability of factors of production. Investment in physical capital, for example, will probably be discouraged as the risk of a capital loss will tend to rise with political instability, primarily because political and economic rules governing investment are likely to change with political regimes, increasing the uncertainty in future net returns and hence lowering the expected real rates of return associated with investment projects" (Fosu, 1992, p. 830).

From the current account side, Figure 4.2(i) shows that the median current account deficit slightly narrows by 0.1 pp of GDP in the event year, followed by a large variation over time as evident by the wider distribution and swinging median in the subsequent years. Regarding the trade sector, we notice, as illustrated in Figure 4.2(j) and Figure 4.2(k), that both exports and imports tend to decrease by 1.1 and 2.3 pp of GDP during the event year, respectively. This result is consistent with studies that explored the nexus between political instability and trade flows (Ades and Chua, 1997; Blomberg and Hess, 2006; Qureshi, 2013), which found that insecurity and turmoil hinder international trade. However, these dynamics mask considerable heterogeneity across countries as economies adopt separate exchange rate regimes (fixed, managed and floating) and depend differently on the energy sector. For instance, the 31.6 percent increase in the average crude oil price in 2011 had contrasting implications on the trade balances of Jordan and Bahrain which were both similarly impacted by the Arab Spring uprisings that happened in 2011. More specifically, the trade balance of Jordan (Bahrain), an oil importing (exporting) country, decreased (increased) by 5.4 (12.6) pp of GDP during the event year. Finally, Figure 4.2(l) shows that, after periods of mass political unrest, remittances as a ratio of GDP tend to increase over time. This observation can be explained by two phenomena. First, negative shocks to an economy reduce the income of a migrant's relatives in the home country, hence inducing the migrant to send more remittances (International Monetary Fund, 2005). Second, Fosu (1992) argued that worries about political repercussions, usually accompanying political instability events, are likely to push more people to emigrate (brain drain), thus increasing remittance inflows in the future.

4.6 Estimating the Impact and Recovery from Mass Instability Events

The previous section described how different macroeconomic variables behave during and after episodes of mass political instability. In this section we examine the economic impact of such events and the speed of recovery afterwards.

Most existing papers in the literature consider economies to have recovered from shocks (or recessions) once the post-shock output attains its pre-shock level. For example, Flores and Nooruddin (2009) relied on the highest output level reached during the five years preceding a conflict as the counterfactual output a country would have possibly attained had it not been impacted by a conflict, whereas Haussman et al. (2006) considered the income level immediately preceding a recession as the corresponding counterfactual ex-post. Similarly, Reinhart and Rogoff (2014) measured recovery after financial crises as the return to the pre-crisis per capita GDP level.¹³² Meanwhile, Cerra et al. (2013) defined economic recovery following recessions as the first year of growth following a sequence of years with negative annual growth. In addition, Hong and Tornell (2005) considered recovery following currency crises as the deviation of the post-crisis GDP growth rate from that of the “tranquil-period” average, which they defined as “all years exclusive of the crisis year and the 3 years before and after the crisis” (Hong and Tornell, 2005, p. 74).

All these studies strongly assume that the post-shock counterfactual follows the same dynamics as the pre-shock output level. This assumption, however, might not hold in reality, because different global exogenous shocks (commodity price changes, global finance crises and currency crises) that occur after the event, and which tend to impact the local economy, are not

¹³² Becker and Mauro (2006) and Calvo et al. (2006) have also defined economic recovery based on the pre-shock output level, while Cerra and Saxena (2005) considered the output trend prior to the Asian financial crisis as the counterfactual.

captured by the pre-shock output trends. A further critique of this approach is that post-shock counterfactual levels are selected on an ad-hoc basis. As a result, “the measurement of recovery needs to be carefully considered, as it may lead to biased inference” (Cerra and Saxena, 2016, p. 2). To overcome this problem, we employ the Synthetic Control Methodology (SCM), which was already described in detail in section 2.4 of chapter 2. This approach enables us to estimate the counterfactual per capita output that would have been attained in the absence of mass political instability. In particular, counterfactuals constructed using SCM account for global economic shocks that may have occurred in the post-instability period and capture the effects of time-changing variables. Consequently, we define economic recovery (or lack thereof) following a period of mass political instability as the difference between the actual GDP per capita relative to its estimated counterfactual (synthetic or hypothetical) after the event year. A positive difference indicates economic recovery while a negative one indicates that the economy is still ailing from the repercussions of political instability.

4.6.1 Synthetic Control Methodology

SCM, which was considered by Athey and Imbens (2017) as the most important innovation in the program evaluation literature over the last decade, has been widely used in various social science disciplines in the past few years. In particular, this approach has been adopted to evaluate the impact of terrorism (Abadie and Gardeazabal, 2003), counterinsurgencies (Singhal and Nilakantan, 2016), civil wars (Bove et al., 2016; Costalli et al., 2017), trade openness (Nannicini and Billmeier, 2011), economic liberalization (Billmeier and Nannicini, 2013), natural resource discoveries (Smith, 2015), inflation targeting (Lee, 2011), natural disasters (Cavallo et al., 2013) and fiscal consolidation (Kleis and Moessinger, 2016), on economic activity. Moreover, Hope (2016) and Mäkelä (2016) estimated the impact of joining the European Monetary Union on current account balances and long-term government bond yields, respectively. In a different context, Jinjarak et al. (2013) used this technique to examine the effect of changes in the capital account regime on capital inflows in Brazil between 2008 and 2011. This methodology has also

been used to evaluate a range of treatments and policy changes in the health (Bauhoff, 2014; Kreif et al., 2015), labour (Bohn et al., 2014; Calderón, 2014), food (Mohan, 2017) and political science literatures (Arnold and Stadelmann-Steffen, 2017), among others.

SCM is a generalization of the matching and difference-in-difference (DiD) techniques conventionally employed in microeconometrics. However, it is suited for macroeconomic applications when the number of observations in both the treated and control groups is relatively small. In our context, this technique is particularly useful as it allows for a country-by-country assessment of the impact of mass political turmoil, hence providing further insights into possible heterogeneous effects and improving on the literature which focused on evaluating the average treatment effect of political instability (Aisen and Veiga, 2013; Alesina and Perotti, 1996; Jong-A-Pin, 2009).

In what follows we briefly describe the application of the synthetic control method in a general context.¹³³ Let r denote a unit (can usually be country, state or region, but in our case it is a country) that was exposed to an exogenous treatment (in our case mass political instability) at time T , and $c \in \mathcal{C}$ denote a potential control unit that was not exposed to the treatment. In addition, we indicate by $\mathbf{X}$ an $(x \times 1)$ vector of observed covariates that are likely to influence the outcome variable Y . Under certain assumptions (no anticipation, no interference, large pre-treatment period, and structural similarity), Abadie et al. (2010) showed that the outcome and covariates of the treated unit can be approximately matched by a weighted average of control units, called synthetic control (or counterfactual),¹³⁴ such that:

¹³³ For a detailed explanation of the SCM assumptions and mechanics, kindly refer to section 2.4 of chapter 2.

¹³⁴ A counterfactual is how a unit's outcome would have evolved had it not been affected by a treatment.

$$Y_{r,t} = \sum_{c=1}^C w_c^* Y_{c;t} \quad \text{for } t < T \quad (4.1)$$

and

$$X_{r,t} = \sum_{c=1}^C w_c^* X_{c;t} \quad \text{for } t < T \quad (4.2)$$

In equations (4.1) and (4.2) $w_{c \in C}^*$ are the optimal weights assigned to each unit c in the constructed synthetic control. The weights should satisfy the following conditions: (i) $w_{c \in C}^* \geq 0$ and (ii) $\sum_{c=1}^C w_c^* = 1$.

In our case, we apply the synthetic control for each of the 29 countries listed in Table 4.1 where the treatment of interest corresponds to the mass political instability event.¹³⁵ Our outcome variable is real GDP per capita (constant 2010 US\$) as reported in the April 2016 version of the World Development Indicators (WDI) published by the World Bank between 1960 and 2015. In our analysis, the set of potential controls, for each country of interest, includes the universe of economies that were not subjected to mass political turmoil and/or were not impacted by a non-economic exogenous shock (natural disaster, war, etc.) during the corresponding post-treatment year. The selection of a large number of control countries keeps the weights assigned to each donor control as much data-driven as possible, hence ensuring the transparency of our study (Costalli et al., 2017). More importantly, and in contrast to Abadie et al. (2015) and Hope (2016), we cannot limit our controls to neighbouring countries which tend to have similar cultural, economic and social fundamentals as the treated one, because of spillover effects whereby political turmoil (particularly large-scale revolutions) in a certain country might impact others within the same geographical region (Murdoch and Sandler, 2002). For example, the Tunisian revolution that happened in 2011 triggered the Arab Spring uprisings in Bahrain, Egypt, Libya, Syria and Yemen. Finally, a larger set of non-treated controls increases the

¹³⁵ Myanmar does not have real GDP per capita data, therefore we cannot apply the SCM to it. As a result, our sample of countries exposed to political instability is reduced to 29.

likelihood of matching all the individual covariates, hence leading to a more robust counterfactual in the absence of mass political instability.

Furthermore, we adopt the following criteria to ensure the accuracy of our estimates regarding the causal impact of mass political instability on real GDP per capita. First, Abadie et al. (2010) noted that a large pre-treatment period relative to the post-treatment period is necessary to reduce any possible bias. Thus, we impose a pre-treatment period of 20 years, allowing us to have more robust synthetic controls.¹³⁶ Second, to gauge the impact of political turmoil over time, we set the minimum number of post-treatment years to three, meaning that we exclude countries that were subjected to mass political instability after 2011. An example of this is Romania which experienced political turmoil in 2012. Third, in many instances, countries initially impacted by political instability were later exposed to other distinct exogenous shocks.¹³⁷ Hence, to avoid any double treatment problem that would bias our results, our post-political instability assessment period will, in these cases, stop the year before the second exogenous shock occurred.

The set of covariates, based on which we match between treated and un-treated countries includes: investment, consumption, exports, imports (all as a ratio of GDP), secondary school enrolment, net fuel exports (as a ratio of GDP), money supply (as a ratio of GDP) and the type of political regime. The first four variables are chosen because by definition they are the

¹³⁶ In the cases of Chile, Haiti, Portugal and Spain we had to contend ourselves with shorter pre-instability periods because the real GDP per capita series was not available for the whole 20 year-period time span.

¹³⁷ The case of Iran illustrates this point clearly. Iran was exposed, in 2009, to a mass political instability event: large demonstrations in the wake of the presidential elections. Hence, we consider these events as a treatment in our analysis. However, three years later, the U.S. and the EU imposed additional sanctions on the financial and energy sectors which dragged the economy into a recession (International Monetary Fund, 2014). Consequently, if we apply the SCM with 2009 being the treatment year without taking into account for the fact that in 2012 the Iranian economy was hit by another major shock, we would be overestimating the impact of the mass political instability that happened in 2009. As a solution, we stop our post-political instability assessment period the year before the sanctions were imposed (i.e. 2011).

components of our variable of interest, real GDP per capita.¹³⁸ Secondary school enrolment is included in the set of covariates because it is a key driver of future economic growth (Barro, 1991). Moreover, political turmoil in oil exporting countries, such as Bahrain and Iran, could disturb oil supply and consequently have an indirect impact on the global economy. Therefore, we add net fuel exports to our database to capture this possible effect.¹³⁹ In addition, Klein and Olivei (2008) argued that the depth of the financial sector, which can be proxied using money supply (Khan et al., 2001), influences economic growth. In order to control for political and institutional factors, which might impact economic activity (Acemoglu et al., 2001; Góes, 2016), we add the polity2 score which is widely used to measure a country's political regime (Aidt and Leon, 2016; Huang, 2010). For each of these variables, we account for different possible underlying trends by dividing our pre-instability period by half and then taking the decadal average over each sub-period as a covariate. Nonetheless, because data for secondary school enrolment, net fuel exports, money supply and the polity2 index are not available for all countries at all periods, we do not include all the covariates, in certain cases.¹⁴⁰ Finally, and in order to maximize the match between the outcome variable of the treated country and that of its synthetic counterpart during the pre-turmoil period, we add four-year period averages of per capita GDP to our set of covariates. Table A4.4 provides the definition, unit and source of each variable listed above.

¹³⁸ We also intended to control for fiscal policy using the fiscal balance, in addition to the variables that compose the supply side of GDP (industry, agriculture and services), however data for these variables were missing for many countries in our dataset. In cases where data were available, we experimented with different sets of covariates and the results were almost unchanged.

¹³⁹ Net Fuel Exports (as a % of GDP) is the difference between Fuel Exports (as a % of GDP) and Fuel Imports (as a % of GDP). The definitions of these variables are available in Table A4.4.

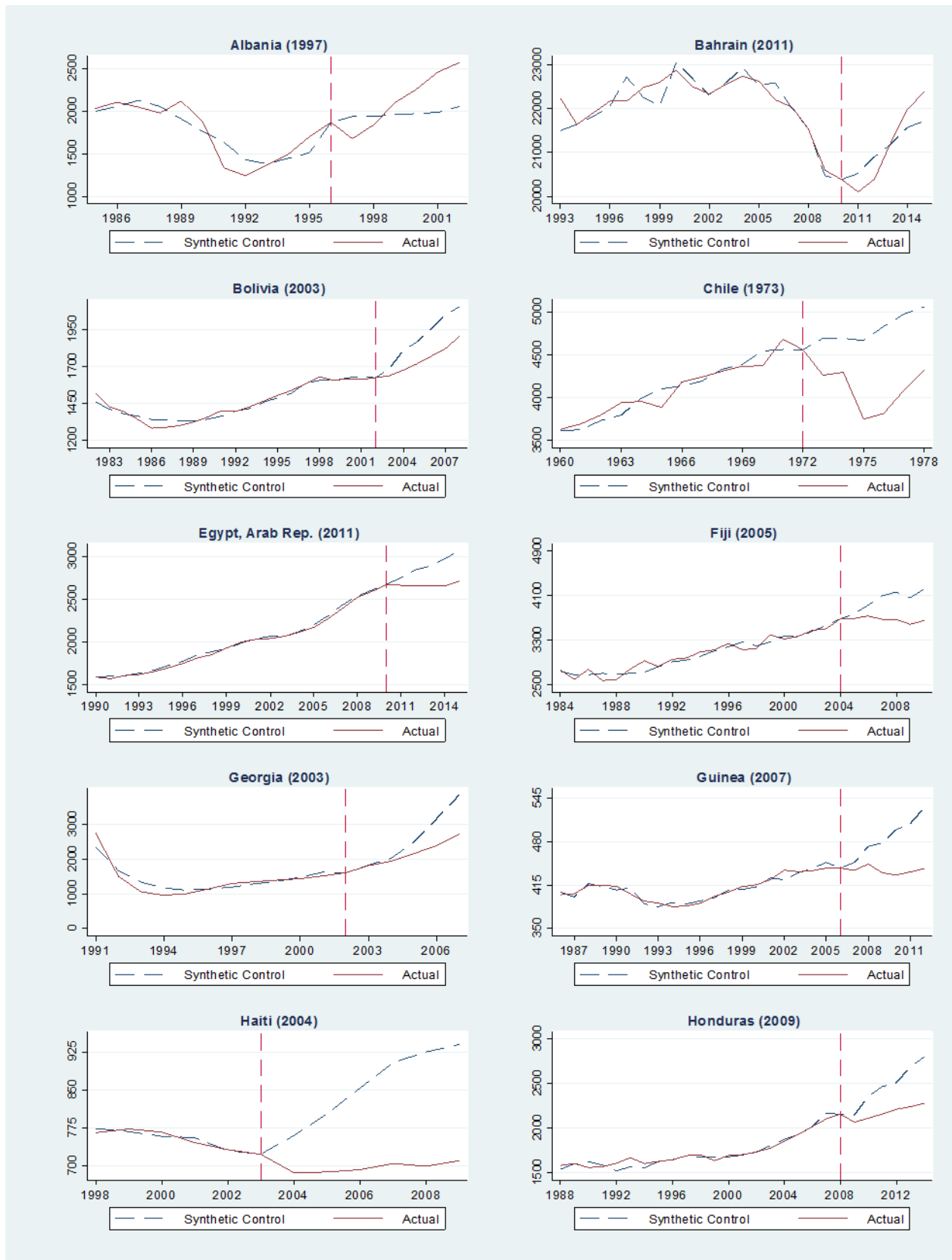
¹⁴⁰ This can be illustrated by the case of Haiti which does not have data on net fuel exports, hence we cannot include this variable in our set of covariates.

4.6.2 Findings

Figure 4.3 (below) depicts the evolution of the actual and counterfactual real GDP per capita for the 29 countries that have suffered from mass political instability. In each case, two lines are plotted: a continuous red line showing the actual per capita GDP of the country in question, and a dashed blue line representing the corresponding counterfactual estimated using SCM. We observe that for all the countries (except for Togo and Peru which are highlighted in red) the path of the synthetic GDP per capita follows closely its actual counterpart prior to the political turmoil event. Moreover, the covariate averages of the treated countries and their respective synthetic counterparts, presented in Table A4.5 together with the weights of the control countries composing each counterfactual, suggest that the constructed synthetic controls match the actual economies reasonably well.

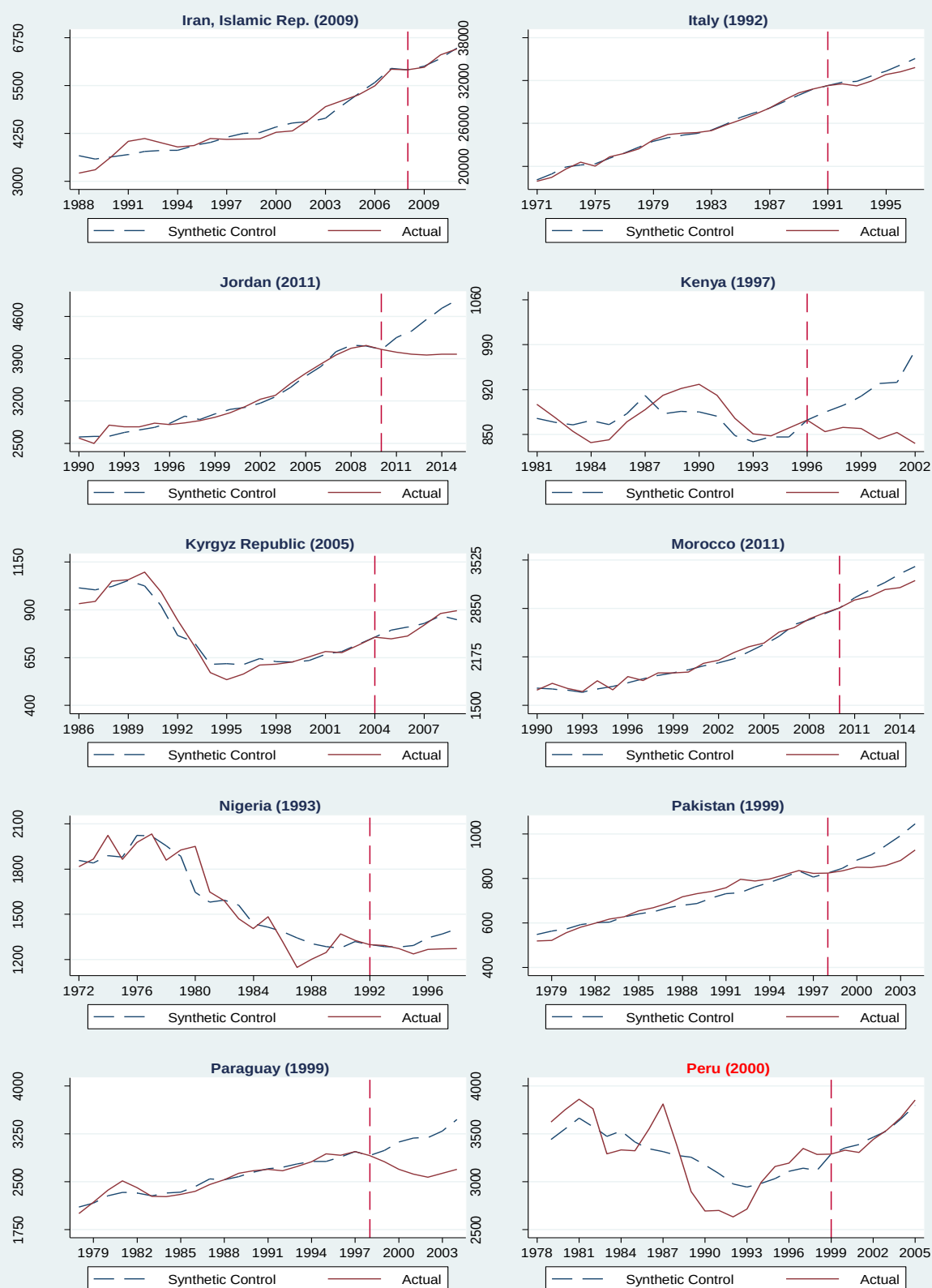
It is noteworthy to mention that in the case of Togo and Peru we could not find a weighted average of control countries that can accurately reproduce the actual real GDP per capita before the mass political instability event. Moreover, and while the synthetic GDP per capita of Kenya and Nigeria had similar overall dynamics compared to their respective actual counterparts, in certain episodes during the pre-intervention period the two lines did not match accurately: the 1989-1991 period in the case of Kenya and the 1986-1988 period in the case of Nigeria. These cases highlight a weakness of SCM when it comes to matching extremely volatile outcome variables during the pre-treatment period, making it hard to develop reliable counterfactuals.

Figure 4.3: Treated vs Synthetic Real GDP per Capita after Mass Political Instability Events



Source: Author's own calculations. Note: Each graph plots the real GDP per capita of the country that experienced mass political instability and that of its synthetic counterfactual. The dashed vertical line indicates the year preceding the beginning of the political instability period.

Figure 4.3 (continued): Treated vs Synthetic Real GDP per Capita after Mass Political Instability Events



Source: Author's own calculations. Note: Each graph plots the real GDP per capita of the country that experienced mass political instability and that of its synthetic counterfactual. The dashed vertical line indicates the year preceding the beginning of the political instability period.

Figure 4.3 (continued): Treated vs Synthetic Real GDP per Capita after Mass Political Instability Events



Source: Author's own calculations. Note: Each graph plots the real GDP per capita of the country that experienced mass political instability and that of its synthetic counterfactual. The dashed vertical line indicates the year preceding the beginning of the political instability period.

When looking at the trajectories of the actual and counterfactual per capita GDP for each country in Figure 4.3, we notice that mass political instability events have some heterogeneous (country-specific) effects on output. For instance, the actual GDP per capita of Haiti fell sharply and then remained flat compared to its estimated counterfactual, the one corresponding to Kyrgyzstan fell initially but bounced back to its counterfactual level four years later, whereas that of Thailand was almost unchanged after the bloodless coup. These results uncover some degree of heterogeneity in economies' reactions to political instability events, hence improving on previous studies (Aisen and Veiga, 2013; Alesina and Perotti, 1996; Jong-A-Pin, 2009) which concealed these differences and only estimated the average economic impact using panel regression techniques.

While the lines plotted in the graphs are suggestive, our aim is to formally examine the impact of mass political turmoil on output, particularly whether the initial real GDP per capita losses are recuperated over time. Thus, to accurately measure economic recovery, we calculate the percentage difference (or output gap) between the actual and synthetic GDP per capita for each country as follows:

$$Diff_{i,t} = \left(\frac{A_{i,t} - S_{i,t}}{A_{i,t}} \right) \times 100 \text{ for } t \geq T. \quad (4.3)$$

In equation (4.3), $A_{i,t}$ and $S_{i,t}$ represent respectively the actual and synthetic real GDP per capita for each country i , while T denotes the event year during which mass political turmoil has happened. Table 4.2 (below) reports the summary statistics of the percentage difference for each year from $T-2$ to $T+5$.¹⁴¹ To assess whether the average percentage differences are significantly different from 0, we run $Diff_{i,t}$ on individual time dummies that equal 1 for the corresponding

¹⁴¹ For comparison purposes, we restrict our recovery period for all the countries to five years. For example, in the case of Italy, the year marking instability was 1992 so the recovery period spans from 1993 till 1997. However, in the case of Iran (Yemen), we restricted the recovery period to two (three) years, because it was impacted by sanctions (conflict) in 2012 (2014) that have nothing to do with economic activity.

normalized year and 0 otherwise.¹⁴² Looking at the two years prior to the mass instability event, we observe that the mean percentage differences were statistically insignificant and their magnitudes were close to 0, especially during the pre-instability year; hence confirming the reliability of the constructed counterfactuals in mimicking the real GDP per capita of the actual countries prior to the instability events. Moving to the post-instability period, the broad picture suggests that political turmoil tends to damage an economy during the event year as the actual GDP per capita is, on average, 4.7 percent lower than its counterfactual that would have prevailed without turmoil. Moreover, we find that during the next five years, the percentage difference increases gradually from 6.6 percent in year $T+1$ to 11 percent in year $T+5$. Although the gap appears to widen with time, we cannot reject the hypothesis that the difference stays constant over the years $T+1$ to $T+5$,¹⁴³ but even that would imply that the initial output loss was, on average, never recovered.

These results are consistent with those of Cerra and Saxena (2005, 2008) for other types of disruptive events. In their first paper, they found that output losses following the 1997 Asian financial crisis were persistent because growth rates did not exceed their pre-crisis trend (so there was no catching up), while in the second they showed that increased political instability, defined as weaker constraints on executive power, causes a 4 percent average permanent loss in output during the next ten post-instability years. Hong and Tornell (2005) also showed that currency crises have a persistent adverse impact on the GDP level as the growth rate takes around three years to fully recover to its pre-crisis trend.¹⁴⁴

¹⁴² To assess the statistical significance, we exclude the constant term from the regression.

¹⁴³ The Wald test for joint significance of the recovery coefficients ($T+1, \dots, T+5$) had a p-value of 0.28.

¹⁴⁴ In contrast, Park and Lee (2001) found that GDP growth follows a V-pattern of adjustment following currency crises, where growth tends to rise slightly above its pre-crisis rate after three years. However, their results suffer from an endogeneity problem, because they regressed the GDP growth during the defined post-crisis period on contemporaneous macroeconomic variables.

Table 4.2: Percentage Difference in Output per Normalized Year in the Case of Mass Political Instability Events

	N	mean	sd	min	max
T-2	27.0	0.6	3.1	-6.7	12.6
T-1	27.0	0.1	0.7	-0.0	3.8
T	27.0	-4.7***	4.7	-18.6	0.5
T+1	27.0	-6.6***	6.0	-23.6	1.5
T+2	27.0	-8.1***	8.0	-27.6	7.4
T+3	25.0	-9.5***	9.7	-30.3	14.4
T+4	24.0	-10.2***	11.5	-29.3	23.8
T+5	17.0	-11.0***	11.7	-25.9	25.1

Source: Author's own calculations. Notes: T denotes the year of the political instability event. We exclude Togo and Peru from this sample because we could not find a reliable counterfactual. Note: the values in the "mean" column represent the regression coefficients of $Diff_{i,t}$ on time dummies, without a constant. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4.2 also shows that the standard deviation grows monotonically starting from T , indicating that the impact of political instability is not uniform across countries. Looking more closely at the results, we notice that we can classify the economies' reactions to mass political instability events into the following four categories:

- *Group 1: No Negative Impact*, if

$$Diff_{i,t} > 0 \text{ for } t = T. \quad (4.4)$$

- *Group 2: Fast Economic Recovery*, if

$$Diff_{i,t} < 0 \text{ for } t = T \text{ and } \text{Average}(Diff_{i,t}) \geq 0 \text{ for } T < t \leq T + 5. \quad (4.5)$$

- *Group 3: Slow Economic Recovery or Small Long-run Negative Impact*, if

$$Diff_{i,t} < 0 \text{ for } t = T \text{ and } -5 \leq \text{Average}(Diff_{i,t}) < 0 \text{ for } T < t \leq T + 5. \quad (4.6)$$

- *Group 4: Large Long-run negative impact*, if

$$Diff_{i,t} < 0 \text{ for } t = T \text{ and } \text{Average}(Diff_{i,t}) < -5 \text{ for } T < t \leq T + 5. \quad (4.7)$$

Table 4.3 groups the countries in our sample according to the above classification. In essence, out of the 27 political instability episodes in our sample,¹⁴⁵ 16 (59.3 percent of all cases) belong to group 4 because they did not recover the initial output loss caused by mass political instability: after a clear drop in the first year, the percentage difference between the actual and estimated counterfactual real GDP per capita is, on average, lower than -5 percent. However, this finding, which contrasts with those of Bernal-Verdugo et al. (2013) who argue that the initial impact of instability (measured by government change) on growth vanishes after 2-3 years, does not tell the whole story as the path and speed of economic recovery appears to vary markedly across groups. More specifically, in the case of Nigeria, the percentage difference between the actual and synthetic per capita GDP was positive during the instability year ($T = 0$) implying that Nigeria was not adversely impacted by mass political turmoil (group 1). Furthermore, out of the 10 remaining cases, 4 (14.8 percent) recovered the entire output lost immediately (group 2), while the other 6 (22.2 percent) experienced a slow but steady economic recovery path (group 3). Our findings also suggest that this heterogeneity observed across groups manifests itself within groups. For example, in group 4, the average cumulative loss for the first five years following political turmoil ranged from -6.8 percent in the case of Bolivia to -27.2 percent in the case of the Philippines.

¹⁴⁵ We exclude Togo and Peru from this sample because we could not find reliable counterfactuals.

Table 4.3: Percentage Difference between Actual and Synthetic GDP per Capita (%)

No Negative Impact			Fast Economic Recovery			Slow Economic Recovery or Small Long-run Negative Impact			Large Long-run negative impact		
Country	1st year diff.	Post treatment average diff	Country	1st year diff.	Post treatment average diff	Country	1st year diff.	Post treatment average diff	Country	1st year diff.	Post treatment average diff
Nigeria	0.53	-5.45	Albania	-13.37	13.11	Fiji	-1.74	-0.57	Bolivia	-2.90	-9.12
			Bahrain	-2.05	0.71	Italy	-0.79	-2.39	Chile	-9.22	-16.31
			Iran, Islamic Rep.	-0.44	0.57	Morocco	-1.10	-4.41	Egypt, Arab Rep.	-3.26	-9.15
			Kyrgyz Republic	-5.72	0.03	Thailand	-0.11	-2.34	Georgia	-0.80	-17.75
						Turkey	-1.50	-4.88	Guinea	-2.58	-11.95
						Ukraine	-2.18	-4.31	Haiti	-9.65	-20.71
									Honduras	-3.70	-13.94
									Jordan	-5.72	-14.06
									Kenya	-3.42	-8.36
									Pakistan	-1.29	-8.40
									Paraguay	-5.99	-18.72
									Philippines	-12.81	-27.20
									Portugal	-9.27	-8.24
									Spain	-3.44	-13.13
									Tunisia	-6.93	-9.65
									Yemen, Rep.	-18.55	-20.51

Source: Author's own calculations. The "1st year diff." represents the percentage difference between the actual and synthetic real GDP per capita during the year in which the political instability event happened, while "Post treatment average diff." is the percentage difference averaged over the whole post-political instability period.

While determining the channels through which mass political instability events impact the economy is beyond the scope of this chapter, we briefly illustrate in Table A4.6 in the appendix how the different GDP components behave during the event year when averaged across the four groups defined earlier. We observe two clear patterns that are common to all groups, although at varying magnitudes: the share of total investment drops while that of household consumption increases. The first observation is consistent with the view that investment is very sensitive to political instability because during such periods uncertainty increases which, in turn, induces firms to postpone investment decisions (Julio and Yook, 2012). On the other hand, and in line with previous research (Devereux and Wen, 1998; Khandelwal and Roitman, 2013), private consumption appears to be much more resilient to political turmoil.

Unfortunately, SCM does not estimate standard errors, which prevents us from making formal statements regarding the statistical significance of the results. To address this issue, we follow Campos et al. (2014) and estimate difference-in-difference (DiD) models for the actual and counterfactual GDP per capita corresponding to each of the 27 countries impacted by political turmoil and for which we were able to find a suitable counterfactual. More specifically, we estimate the following regression:

$$\log(Y_{i,t}) = c + \beta_1.Treatment_i + \beta_2.Post_t + \beta_3.(Treatment_i \times Post_t) + \beta_4.(Treatment_i \times Post_{T < t \leq T+5}) + \varepsilon_{it} \quad (4.8)$$

where:

- $Y_{i,t}$ represents the real GDP per capita of unit i (denoting the actual country or its synthetic counterpart) at time t .
- $Treatment_i$ is a dummy variable that takes the value 1 if i belongs to the treated (actual) country and 0 otherwise.
- $Post_t$ is a dummy variable that takes the value 1 if the observation falls during or after (up to five years) the mass political instability event and 0 otherwise.

Our coefficients of interest are β_3 and β_4 : The former can be interpreted as the economic impact of political turmoil during the instability year, while the latter captures the average effect in the next five years. In particular, a significantly negative β_3 implies that the economy lost output because of political instability, while a negative β_4 suggests that, on average, the initial adverse impact is persistent over time (i.e. there is a less than full recovery compared to the pre-instability period).

Table A4.7 reports the estimation results for each model: the diff-in-diff coefficients (β_3 and β_4), the number of observations and the corresponding R^2 . For the majority of countries classified under group 4 (except for Egypt, Portugal and Spain), the β_3 coefficients are significantly negative, implying that these economies were considerably damaged by mass political instability during the event year. Moreover, the β_4 coefficients remain largely (and in most cases significantly) negative, indicating that the actual GDP per capita did not recover its initial output loss. In contrast, Nigeria, which belongs to group 1, was associated with an insignificant and relatively small (in absolute terms) β_3 , meaning that political instability did not have a significant adverse impact on the economy. Meanwhile, all the economies that belong to group 2 had a negative β_3 and a positive β_4 , implying that they fully recovered their initial losses over time. Regarding countries in group 3, we notice that while the signs of the β_4 coefficients remained negative, their magnitudes were much smaller than those of β_3 , suggesting that these economies were recovering, although slowly, from political turmoil.¹⁴⁶ In summary, the DiD estimates corroborate the SCM results which suggest that mass political instability events have, on average, an adverse impact on economies, though with a significant degree of heterogeneity across countries.

¹⁴⁶ In the case of Thailand, the β_4 even became positive.

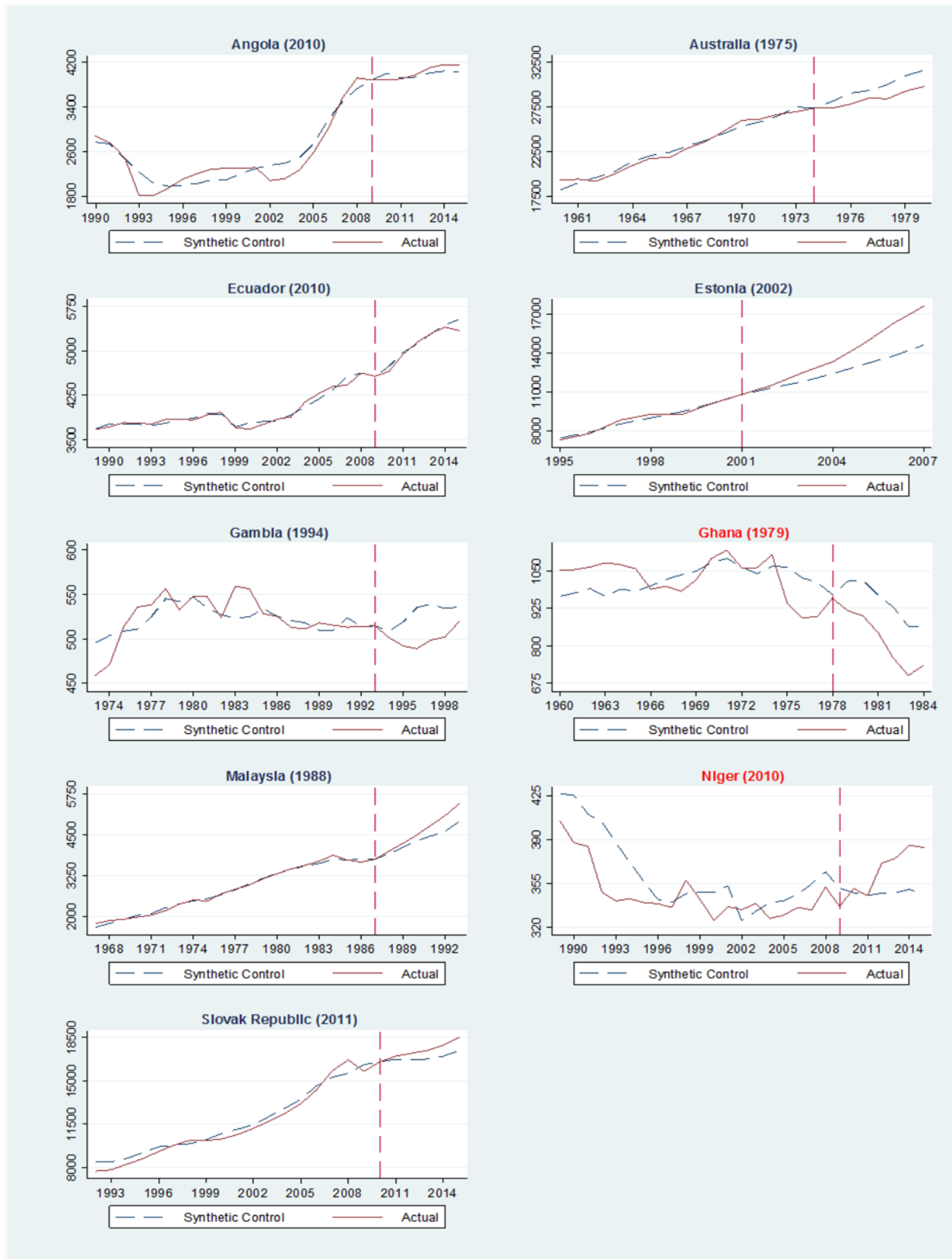
4.6.3 The Impact of Political Regime Crises without Mass Civil Protest

In this section, we test whether the combination of a regime crisis and mass civil protest is more economically damaging than when the regime crisis happens unaccompanied by mass protest. There are three potential reasons that could underlie this hypothesis. First, the protest itself may be directly damaging – for example, if people stop work and/or business is disrupted. Second, mass civil protest may signal that the regime crisis is particularly severe, therefore having larger and/or longer-lasting output effects. Third, mass civil protest may also have a profound effect on future expectations and the level of uncertainty, because mass protests tend to be inherently volatile and unpredictable in ways that conventional politics is not.

To test our conjecture, we apply the SCM used above on a set of 10 countries listed in Table A4.8 which, according to the CNTS database, experienced major political regime crises without being accompanied by mass civil protest. We should note that the real per capita GDP series for Qatar only starts in 2000 (five years after the coup), meaning that we could not apply the SCM to it, therefore our sample of countries shrinks to 9.

Figure 4.4 below illustrates the path of the actual and counterfactual real GDP per capita for these countries, while Table A4.9 in the appendix reports the covariate averages for the treated and synthetic countries together with the weights composing each counterfactual. It can be seen from Figure 4.4 that the estimated counterfactuals for Ghana and Niger do not closely mimic the corresponding actual per capita GDP prior to the treatment. Accordingly, we will exclude these two countries from the subsequent analysis to avoid possible biases.

Figure 4.4: Treated vs Synthetic Real GDP per Capita, Political Regime Crises Without Civil Protest



Source: Author's own calculations. Note: Each graph plots the real GDP per capita of the country that experienced political regime crises and that of its synthetic counterfactual. The dashed vertical line indicates the year preceding the beginning of the political instability period.

A visual inspection of the graphs in Figure 4.4 indicates that the average impact of political regime crises is much more muted than when these events are accompanied by mass civil protest. In particular, Table 4.4 confirms our observation as the output gap between the actual and synthetic per capita GDP is, on average, only negative 0.5 percent during the event year but turns positive thereafter, in stark contrast with the 4.7 percent average drop in the case of mass political instability reported in Table 4.2 in section 4.6.2. However, the large standard deviations suggest some degree of heterogeneity across countries that only experienced political regime crises, similar to the result found in the cases of mass political instability.

Table 4.4: Percentage Difference per Normalized Year in the Case of Political Regime Crises Without Mass Civil Protest

	N	mean	sd	min	max
T-2	7.0	-0.4	2.8	-3.4	5.2
T-1	7.0	0.0	0.0	-0.0	0.0
T	7.0	-0.5	2.2	-2.9	2.0
T+1	7.0	0.2	4.0	-5.3	5.8
T+2	7.0	0.8	5.3	-8.7	7.5
T+3	7.0	2.0	6.9	-7.4	12.0
T+4	7.0	3.6	8.8	-6.0	18.2
T+5	6.0	3.7	10.3	-5.7	20.6

Source: Author's own calculations. Notes: T denotes the year of the political instability event. We exclude Ghana and Niger from this sample because we could not find a reliable counterfactual.

We can statistically test our proposition that political regime crises are more damaging to an economy when they are accompanied by mass civil protest (riots, strikes or demonstrations), by simply regressing the estimated output gap ($Diff_{i,t}$) on a dummy variable that equals 1 if a country experienced political instability together with mass civil protest and 0 if it was subjected to a political regime crisis only. The sample consists of political instability events with and without mass civil protest.¹⁴⁷ The results of that test are reported in Table 4.5. The estimated

¹⁴⁷ As a reminder, there are 27 mass political instability events (we excluded Togo and Peru because it did not have a good counterfactual) and 7 political regime crises episodes that were not accompanied by mass civil protest (we excluded Ghana and Niger because they did not have good counterfactuals).

coefficient on the mass civil protest dummy is negative and highly significant, hence supporting our claim that political regime crises not accompanied by mass civil protest have smaller negative output effects compared to mass political instability events.

Table 4.5: Regression of Percentage Difference on the Mass Civil Protest Dummy

	Dependent Variable: $Diff_{i,t}$					
	T	T+1	T+2	T+3	T+4	T+5
Mass Civil Protest	-4.235*** (1.232)	-6.778*** (1.881)	-8.913*** (2.488)	-11.492*** (3.195)	-13.857*** (4.063)	-14.769*** (5.122)
Constant	-0.506 (0.845)	0.191 (1.515)	0.795 (2.002)	2.038 (2.579)	3.624 (3.219)	3.723 (4.297)
Observations	34	34	34	32	31	23

Bootstrapped standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The sample consists of political instability events with and without mass civil protest.

4.7 Determinants of the Output Gap after Mass Political Instability

Focusing back on events of mass political instability (the main aim of this chapter), Table 4.6 shows that, during each recovery period, the number of countries with a negative change in the output gap (deterioration) is much bigger than the number with a positive change (recovery), cementing our earlier finding that mass political instability events have a level and a growth effect as they do not only reduce the income level during the event year, but also lower the pace of recovery afterwards.

Table 4.6: Number of Countries per Year

	Recovery	Deterioration	Total
T+1	6	21	27
T+2	5	22	27
T+3	6	19	25
T+4	9	15	24
T+5	6	11	17

Source: Author's own calculations. Notes: "Recovery" denotes $Diff_{i,t} - Diff_{i,t-1} > 0$, while "Deterioration" denotes $Diff_{i,t} - Diff_{i,t-1} < 0$.

Consequently, and in order to understand why certain economies recover while others relapse, this section examines which variables (if any) correlate with the change in the output gap following episodes of mass political instability.

4.7.1 Baseline Results

To do so, we consider the yearly change in $Diff_{i,t}$ as the dependent variable and estimate an augmented version of the Mankiw et al. (1992) model by adding variables drawn from the theoretical arguments presented in section 4.3 regarding the possible determinants of recovery following mass political instability events. More specifically, our baseline specification is:

$$Diff_{i,t} - Diff_{i,t-1} = \beta X_{it} + \theta Z_{it} + \mu_i + \delta_t + \varepsilon_{it} ; for T < t \leq T + 5. \quad (4.9)$$

In equation (4.9), X_{it} is a vector containing the baseline explanatory variables from the Mankiw et al. (1992) framework. It includes the change in the rate of investment,¹⁴⁸ the income level in the previous year, and the change in the secondary school enrolment which has been widely used by economists to proxy for human capital (Baldacci et al., 2008; Baum and Lake, 2003; Mankiw et al., 1992).¹⁴⁹ The vector Z_{it} contains the inflation rate which we use to control for macroeconomic stability (Elbadawi and Soto, 2013; Hong and Tornell, 2005),¹⁵⁰ the change in the Polity2 index to proxy for different institutional frameworks (Costalli et al., 2017), the changes in exports and imports as a share of GDP to control for trade openness, and finally the change in the official development assistance per capita (Kang and Meernik, 2005) to capture the

¹⁴⁸ We also experimented with the ratio of FDI to domestic investment (the latter was calculated as the difference between total investment and FDI), but the results remained quantitatively unchanged.

¹⁴⁹ While school enrolment might not be ideal to measure human capital (Temple, 1999), we could not use the Barro and Lee (2001) educational attainment measure because it was only available up to 2010, meaning that countries that were impacted by the Arab uprisings in 2011 would have been excluded from our sample.

¹⁵⁰ Another variable that was used in the literature (Easterly and Schmidt-Hebbel, 1993; Hong and Tornell, 2005) to proxy for macroeconomic stability is the government fiscal balance as a ratio of GDP. Unfortunately, we cannot use this variable as it is only available for 78 out of 130 possible observations.

amount of external assistance a domestic country receives.¹⁵¹ Table A4.10 presents summary statistics for the above variables and Table A4.4 includes the corresponding definition, unit and source.¹⁵² Finally, we add country and year fixed effects denoted by μ_i and δ_t , respectively. The former controls for time-invariant country characteristics,¹⁵³ while the latter captures global economic conditions prevalent at a specific period in time.¹⁵⁴

Unfortunately, we were not able to control for social fragmentation within societies as the party fractionalization index available in the Cross-National time series database and the one produced by Beck et al. (2001) do not exhibit large variations across years, because changes in political representation only happen after new elections or when significant changes in the political system take place. Moreover, the former index is only constructed up to 2006, whereas the latter is only available up to 2012. Another variable which we could not account for, due to data limitation, is the identity of the ruling party. However, we think the importance of this omission is mitigated by the fact that this variable is highly correlated with the macroeconomic policy proxy since good leaders are more likely to adopt sound policies.

¹⁵¹ We re-estimated all our regressions using official development assistance as a ratio of GNI instead of per capita and our main results are unchanged.

¹⁵² Figure A4.2 in the appendix unveils a strong and positive correlation (0.76) between the number of fixed telephone subscriptions and GDP per capita, implying that it may not be suitable to add the former variable as a regressor because this might inflate the standard errors, especially that our sample size is small. In addition, we apply a Principal Component Analysis (PCA) on the following three variables to construct a multidimensional index of governance quality: bureaucratic quality, corruption level and the prevalence of law and order (Demetriades and Law, 2006; Keefer and Knack, 2007). Unfortunately, Figure A4.3 shows that the estimated multidimensional governance index is also highly correlated (0.75) with GDP per capita, indicating that we could not add it to our set of explanatory variables as this would lead to multicollinearity, hence rendering the estimates less stable.

¹⁵³ Time-invariant country characteristics include, among other things, historical and legislative factors as well geographical and ethno-linguistic variables and the specific type of the political instability event (violent or non-violent coup, government crises, etc.).

¹⁵⁴ We employ bootstrapped standard errors (with 1000 replications) because our measure of economic recovery is a generated variable.

Overall, our sample includes the 29 countries presented in Figure 4.3, each with a minimum of 1 and a maximum of five recovery years. As reported in Table A4.10, inflation reached a maximum of 504.7 percent. To avoid this kind of outlier which might bias our results, we follow Bleaney (1996) and impose a 100 percent cap on the inflation rate. Given the small sample size and in order not to lose valuable information, we initially restrict our set of explanatory variables to those with the biggest number of observations and then add, at each stage, variables with the second highest number of data points.¹⁵⁵

One challenge to our estimation strategy is the simultaneity between worsened economic conditions and recovery, as the causality between these two variables could run both directions. One solution to this problem would be to instrument each regressor with an exogenous variable, however finding credible instruments is a challenging task. Moreover, we are not able to employ system-GMM, which has been used extensively in the literature to deal with endogeneity,¹⁵⁶ because the number of time periods available in our panel is relatively small. Therefore, our results, presented in Table 4.7 (below), should be carefully interpreted as conditional relationships of the regressors with the change in the output gap, rather than causal associations. In particular, a positive and strongly significant coefficient implies that a higher value of the variable in question is associated with a faster recovery.

¹⁵⁵ Because of missing observations, our sample size is largely reduced as new variables are added. For example, when all the regressors in column (3) of Table 4.7 are included, the number of observations shrinks to 66.

¹⁵⁶ Aisen and Vega (2013), Bernal-Verdugo et al. (2013) and Jong-A-Pin (2009) have all used system-GMM to overcome the simultaneity issue.

Table 4.7: Baseline Regression of Recovery after Political

	(1)	(2)	(3)
Change in GCF/GDP	0.442*** (0.161)	0.510*** (0.188)	0.774** (0.308)
log(GDP per capita(-1))	-0.239*** (0.049)	-0.230*** (0.059)	-0.209** (0.088)
Inflation	0.007 (0.038)	0.010 (0.043)	-0.004 (0.061)
Change in Polity2	-0.420*** (0.111)	-0.470*** (0.106)	-0.361* (0.210)
Change in Exp/GDP	-0.007 (0.091)	-0.032 (0.102)	0.038 (0.209)
Change in Imp/GDP	-0.152* (0.091)	-0.166 (0.103)	-0.279** (0.136)
Change in ODA/Pop		0.009 (0.015)	0.042 (0.038)
Change in School Ratio			-0.069 (0.135)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	122.0	102.0	66.0

Bootstrapped standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Notes: In all the specifications, the dependent variable is the yearly change in the percentage difference between actual and synthetic GDP per capita. The (-1) represents the first lag of the corresponding variable.

Starting with the first specification (column 1), which includes regressors with the highest number of observations, we find that the previous year's income level is negatively associated with the change in the output gap.¹⁵⁷ This finding, which is in the spirit of the convergence hypothesis advocated by the neoclassical growth theory (Solow, 1956), implies that poor countries tend to recover faster than rich ones after episodes of mass political instability. On the other hand, and in accordance with the growth literature (De Long and Summers, 1991; Mankiw et al., 1992), an increase in the investment ratio is positively associated with economic recovery following episodes of mass instability.

¹⁵⁷ In Table A4.11 in the appendix, we replace the first year lag of GDP per capita by the fifth year lag to fully account for initial conditions; our baseline results remain unchanged.

Our estimation results also suggest that democratization is associated with a slower recovery.¹⁵⁸ This relation, which could seem counterintuitive at first sight, is in line with previous studies that found a negative impact of democratization on growth (Barro, 1996; Tavares and Wacziarg, 2001) and recovery following armed conflicts (Flores and Nooruddin, 2009). Particularly, in insecure democracies, such as countries that suddenly move from long-lasting autocracies to democracies after events of political instability (for instance countries that were directly impacted by the 2011 Arab Spring), legal institutions might be too weak, hence failing to constrain elected leaders from accumulating personal wealth and carrying out inefficient policies (Clague et al., 1996). More importantly, this finding is consistent with the regime-type hypothesis which was presented in section 4.3 and empirically supported by Oatley (2003). The case of Tunisia after the Jasmine revolution is a good illustration of why democratization might hamper recovery after mass political instability events. Since the ousting of Ben-Ali's regime in 2011, Tunisia has been politically divided between two equally powerful camps with different political and economic ideologies: Islamic Fundamentalism and Secularism.¹⁵⁹ The former aimed to impose the Islamic economic principles,¹⁶⁰ whereas the latter was in favour of more liberal policies. This Islamist-Secularist divide fuelled political instability, which adversely impacted the local economy from both a macro (chapter 2) and micro (chapter

¹⁵⁸ Typically, political institutions are time-persistent (Acemoglu et al., 2005). However, following episodes of political instability, they tend to change more often over time because “when an imbalance of power leads to a revolution or the threat of revolution leads to major reforms in political institutions, often they simply influence the way existing political institutions function” (Acemoglu et al., 2005, p. 392). In our sample, the within variation of the yearly change in the polity2 index increases from 1.14 during the five years preceding the political instability event to 1.44 during the recovery period, indicating a larger variation across time. However, to ensure that this finding was not driven by Kenya, the Philippines and Yemen, which exhibit large changes in democratization during the recovery period (possibly biasing our results), we omit these countries from our sample and find, as illustrated in Table A4.12 in the appendix, that the significantly negative association between democratization and recovery is unchanged.

¹⁵⁹ Section 2.2.1 describes the political developments in Tunisia since the Arab Spring.

¹⁶⁰ Habibi (2012) details the Islamic economic ideology.

3) perspective. In light of these developments, Tunisians' support for democracy has waned sharply as 48 percent of Tunisians were in favour of a democratic regime in 2014, down from 63 percent two years earlier (Pew Research Center, 2014). Looking at our full set of countries that experienced mass political instability, Figure A4.4 in the appendix visually presents the relationship between the average change in the output gap and that of the polity2 index during the recovery period. It shows that the majority of countries fall in the upper-left (recovery under autocratization) and lower-right (deterioration under democratization) quadrants, providing further support to the negative relationship between democratization and recovery.

Lastly, we find a negative and slightly significant coefficient on the change in the imports-to-GDP ratio. However, this variable loses significance in the subsequent specifications after adding additional variables and after performing different sensitivity checks, meaning it is not a robust correlate of post-instability recovery.

In columns (2) and (3) we introduce the other potential determinants of recovery. While the coefficients corresponding to the newly added variables are statistically insignificant, those pertaining to the change in the investment ratio and the institutional framework as well as the one corresponding to the lagged per capita GDP remain significant and their respective magnitudes remain almost unchanged.

4.7.2 Robustness Analysis

In this section we perform several robustness checks to examine the sensitivity of our baseline results. As noted in section 4.6.2, the constructed counterfactuals did not match accurately the per capita GDP and characteristics for Kenya, Nigeria, Togo and Peru during the pre-instability period. Therefore, we re-estimate all the specifications after excluding these three countries from our sample to test whether our findings were driven by any inaccuracies. The results of this test, presented in panel I of Table A4.13, confirm the negative (positive) association

between the income level and democratization (investment ratio) on the one hand and recovery following political turmoil on the other hand.

We perform an additional robustness test by omitting Egypt and Jordan from our sample because both countries were impacted by large idiosyncratic shocks during the recovery period, possibly biasing our results, regarding the adverse impact of mass political turmoil over time, upward. In particular, the Egyptian economy suffered from a second revolution in 2013 which toppled Mohamed Morsi, while Jordan saw its real GDP per capita plummet since 2012 mainly due to a surge in its population stemming from the influx of more than 639,000 Syrian refugees (around 10 percent of its population) in 2012-2013 (World Bank, 2016). The regression results after these exclusions, which are presented in panel II of Table A4.13, support our initial findings.

As illustrated earlier in Figure 4.1, instability stemming from political unrest tends to persist over time. Moreover, Huntington (1968) claimed “that the principal defining characteristic of a post-conflict regime is its stability, not its regime type” (Flores and Nooruddin, 2009, p. 8). Accordingly, one might argue that economic recovery is a function of political stability during the recovery period, whereby additional unrest tends to further exacerbate any initial adverse impact. In Table A4.14, we test this hypothesis by including measures of political instability events during the recovery period ($T < t \leq T + 5$) to our baseline specification. In panel I, we add a dummy variable that takes the value 1 if country i experienced a mass political instability event and 0 otherwise, while in panel II we include the six individual political instability indicators we relied on to identify episodes of mass political turmoil. It turns out that the inclusion of instability indicators during the recovery period does not alter our main findings.

In sum, our robustness tests confirm that poorer countries and those that invest more tend to recover faster following mass political crises. Our estimation results also suggest that

democratization is inversely related to recovery. Nevertheless, the following limitations should be considered when analysing these findings. One concern is the omitted-variable bias, which we tried to minimize by adding as many explanatory variables as possible and using country and year fixed effects. However, due to data scarcity we cannot claim that we have fully controlled for it. In addition, the simultaneity issue, highlighted in section 4.7.1, remains an important caveat of this analysis. Therefore, future research is needed to tackle these possible endogeneity biases.

4.8 Conclusion

In this chapter, we investigate the economic implications of political instability and attempt to uncover the reasons behind the observed differences in the speed at which economies recover (or deteriorate) from such events.

In particular, we focus on mass political instability events, defined as political regime crises accompanied by mass civil protest, up to a five-year horizon. We identified these events based on the 2015 Cross-National Time database and Jong-A-Pin's (2009) classification of different dimensions of political instability, and we were careful to filter out cases where other types of disruptive events such as economic crises and armed conflicts had occurred during the relevant period. More importantly, we derive a new measure of economic recovery. In contrast to previous studies which considered the pre-shock output as a potential counterfactual, hence ignoring the opportunity costs of shocks and strongly assuming that the output level follows the same trend over time, we construct reliable counterfactuals that capture global shocks and account for time variation using the synthetic control method. Another attractive feature of this approach is that it allows for a country-by-country assessment of the impact of political turmoil, thereby providing further insights into possible heterogeneous effects and improving on the literature which focused on evaluating the average treatment effect.

Using our newly constructed measure, we find that mass political instability events result, on average, in a significant fall in output that is not recovered over the subsequent five years. This is similar to what usually happens after other major disruptive events, such as exceptionally deep recessions or currency crises. However, this finding does not convey the whole story as our empirical strategy unveils some degree of heterogeneity in economies' reactions to mass political instability events; unlike earlier studies which only estimated the average economic impact of different political instability indicators using panel-regression techniques. Another main contribution of this chapter to the literature is that political regime crises not accompanied by mass civil protest are found to have significantly smaller negative output effects than those with mass civil protest. Furthermore, we find that faster economic recovery after mass political instability events is a characteristic of poor countries and those which invest more following episodes of political unrest. On the other hand, our results indicate a negative relationship between democratization and recovery after mass political instability.

The findings of this chapter suggest some avenues for further research. While we have explored which country characteristics are associated with faster economic recovery after mass political instability, it would be interesting to determine the direction of causality. Unfortunately, we could not do that because of simultaneity issues as the causality between worsened economic conditions and instability could run both directions. In particular, it was hard to find credible instruments for each explanatory variable. Moreover, we were not able to employ the system-GMM because the number of time periods available in our panel is small. Another possible avenue for research is to explore which sectors and groups within an economy are more resilient to political instability shocks. Finally, there is a need to collect more micro data to understand investors' and consumers' reactions to instability and compare them to other economic shocks.

Appendix for Chapter 4

Table A4.1: Classification of Political Instability Events According to Jong-A-Pin (2009)

Indicator	Definition	Source	Category
Assassinations	Any politically motivated murder or attempted murder of a high government official or politician.	Databanks International (2005)	Politically Motivated Violence
Cabinet changes	The number of times in a year that a new premier is named and/or 50% of the cabinet posts are occupied by new ministers	Databanks International (2005)	Instability of the Political Regime
Civil war	Dummy variable, 1 if at least 1000 battle related deaths per year in a conflict between the government of a state and internal opposition groups without foreign intervention and 0 otherwise.	Gleditsch et al. (2002)	Politically Motivated Violence
Coups d'etat	The number of extraconstitutional or forced changes in the top government elite and/or its effective control of the nation's power structure in a given year.	Databanks International (2005)	Instability of the Political Regime
Major government crises	Any rapidly developing situation that threatens to bring the downfall of the present regime, excluding situations of revolt aimed at such overthrow.	Databanks International (2005)	Instability of the Political Regime
Demonstrations	Any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature.	Databanks International (2005)	Protests
Ethnic tensions	An assessment of the degree of tensions within a country which is attributable to racial, nationality or language divisions.	ICRG (2005)	Instability Within the Political Regime
Executive changes	The number of times in a year that effective control of the executive changes hands.	Databanks International (2005)	Instability Within the Political Regime
Fractionalization	The probability that two deputies picked at random from the legislature will be of different parties.	Beck et al. (2001)	Instability Within the Political Regime
Government stability	An assessment of the governments ability to carry out its declared programs and its ability to stay in office.	ICRG (2005)	Instability Within the Political Regime
Guerilla warfare	Any armed activity, sabotage, or bombings carried on by independent bands of citizens or irregular forces and aimed at the overthrow of the present regime.	Databanks International (2005)	Politically Motivated Violence
Internal conflicts	An assessment of political violence in the country and its actual or potential impact on governance.	ICRG (2005)	Instability Within the Political Regime
Major constitutional changes	The number of basic alterations in a state's constitutional structure, the extreme case being the adoption of a new constitution that significantly alters the prerogatives of the various branches of	Databanks International (2005)	Instability of the Political Regime

Source: Jong-A-Pin (2009).

Table A4.1 (Continued): Classification of Political Instability Events According to Jong-A-Pin (2009)

Indicator	Definition	Source	Category
Medium civil conflicts	Dummy variable, 1 if there are more than 25 battle related deaths per year and a total conflict history of more than 1000 battle related deaths, but fewer than 1000 per year (between the government of a state and internal opposition groups without foreign	Gleditsch et al. (2002)	Politically Motivated Violence
Minor civil conflicts	Dummy variable, 1 if there are at least 25 battle related deaths per year for every year in the period in a conflict between the government of a state and internal opposition	Gleditsch et al. (2002)	Politically Motivated Violence
Number of elections	The number of elections held for the lower house of a national legislature in a given year.	Databanks International (2005)	Instability Within the Political Reg
Polarization	Maximum polarization between the executive party and the four principle parties of the le	Beck et al. (2001)	Instability Within the Political Reg
Years of ruling party in office	Number of years that the party of the chief executive has been in office.	Beck et al. (2001)	Instability Within the Political Reg
Purges	Number of systematic repressions (or eliminations) by jailing or execution of political opposition within the rank of the regime or the opposition.	Databanks International (2005)	No Category
Regime changes	Dummy variable, 1 if the variable "durable" is 0 in the polity IV dataset, which means that a new regime has started or that the state is in anarchy, 0 otherwise.	Marshall and Jaggers (2002)	Instability of the Political Regime
Religious tensions	An assessment of the degree of tensions within a country which is attributable to religious	ICRG (2005)	Politically Motivated Violence
Revolutions	Any illegal or forced change in the top governmental elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence	Databanks International (2005)	Politically Motivated Violence
Riots	Any violent demonstration or clash of more than 100 citizens involving the use of physical	Databanks International (2005)	Protests
Number of veto players who drop	The percent of veto players that drop from the government given the senate does not cha	Beck et al. (2001)	Instability Within the Political Reg
Strikes	Any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority.	Databanks International (2005)	Protests

Source: Jong-A-Pin (2009).

Table A4.2: Definition of Mass Political Instability Components

Variable	Definition
General Strikes	Any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority.
Riots	Any violent demonstration or clash of more than 100 citizens involving the use of physical force.
Anti-government Demonstrations	Any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature.
Coups d'État	Whether an extraconstitutional or a forced change in the top government elite and/or its effective control of the nation's power structure has taken place in a given year. The term "coup" includes, but is not exhausted by, the term "successful revolution".
Major Constitutional Changes	Whether basic alterations in a state's constitutional structure, the extreme case being the adoption of a new constitution that significantly alters the prerogatives of the various branches of government, have happened in a given year. Examples of the latter might be the substitution of presidential for parliamentary government or the replacement of monarchical by republican rule.
Major Government Crises	Any rapidly developing situation that threatens to bring the downfall of the present regime - excluding situations of revolt aimed at such overthrow.

Source: CNTS database.

Table A4.3: List of Excluded Episodes of Mass Political Instability

Country	Event Date	Reason for Exclusion
Algeria /1	1992	Military coup that was followed by a civil war up till 1998
Argentina /2	2001	Riots were the result of an economic crisis that started in 2001
Bulgaria /3	1997	Mass protests over an economic crisis that started in 1996
Cote D'Ivoire /4	2000	Political instability evolved into a civil war in 2002
Ecuador /5	2000	Riots were the result of a financial crisis that started in 1999
Greece /6	2011	Large protests due to an economic crisis
Guatemala /7	2009	Political crisis followed by natural disasters in 2010 and 2011
Indonesia /8	1998	Riots were the result of the Asian financial crisis that started in 1997
Iran, Islamic Rep. /9	1978	Followed by the war with Iraq that started in 1980
Latvia /10	2009	Violent protests following a balance-of-payments crisis
Lebanon /11	2005	Followed by the 2006 war with Israel
Libya /12	2011	Political instability evolved into an armed conflict since 2012
Nepal /13	2002	Happened during the 1996-2006 civil war
Panama /14	1987	Panama was invaded by the U.S. in 1989
South Africa /15	1990	South Africa experienced a banking crisis in 1989
Venezuela /16	1991	This was preceded by an IMF program in 1989

/1 <http://www.bbc.co.uk/news/world-africa-14118852>

/2 <https://www.imf.org/external/np/pdr/lessons/100803.pdf>

/3 <http://www.case-research.eu/en/node/55404>

/4 <http://www.globalsecurity.org/military/world/war/ivory-coast-2002.htm>

/5 <https://www.imf.org/external/pubs/ft/wp/2004/wp0412.pdf>

/6 <https://www.theguardian.com/business/2011/oct/31/eurozone-debt-crisis-greece-crisis-timeline>

/7 <https://www.fas.org/srgp/crs/row/R42580.pdf>

/8 <http://www.imo-imf.org/imo/files/completedevaluations/BP043.pdf>

/9 http://www.iranchamber.com/history/iran_iraq_war/iran_iraq_war1.php

/10 <http://www.nytimes.com/2009/01/14/world/europe/14iht-latvia.4.19364643.html>

/11 <https://www.imf.org/external/np/dm/2007/012507.htm>

/12 <https://www.imf.org/external/pubs/ft/scr/2013/cr13150.pdf>

/13 <https://www.lindenwood.edu/jigs/docs/volume1Issue1/essays/114-131.pdf>

/14 <http://andromeda.rutgers.edu/~hbf/panama.htm>

/15 <http://pdfproc.lib.msu.edu/?file=/DMC/African%20Journals/pdfs/transformation/tran009/tran009003.pdf>

/16 <http://www->

wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/1999/08/15/000009265_3970701170011/Rendered/PDF/multi0page.pdf

Table A4.4: Data Variables, Definition and Sources

Covariate	Unit	Definition	Source
Consumption	% of GDP	Final consumption expenditure (formerly total consumption) is the sum of household final consumption expenditure (private consumption) and general government final consumption expenditure (general government consumption). This estimate includes any statistical discrepancy in the use of resources relative to the supply of resources.	WDI
Gross Capital Formation	% of GDP	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress." According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.	WDI
Imports	% of GDP	Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.	WDI
Exports	% of GDP	Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.	WDI
Fuel Exports	% of Merchandise Exports	Fuels comprise SITC section 3 (mineral fuels).	WDI
Fuel Imports	% of Merchandise Imports	Fuels comprise the commodities in SITC section 3 (mineral fuels).	WDI
Secondary School Enrollement	%	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.	WDI
Broad Money	% of GDP	Broad money (IFS line 35L.ZK) is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.	WDI

Table A4.4 (Continued): Data Variables, Definition and Sources

Covariate	Unit	Definition	Source
Polity2	Score between -10 (strongly autocratic) and 10 (strongly democratic)	The Polity conceptual scheme is unique in that it examines concomitant qualities of democratic and autocratic authority in governing institutions, rather than discreet and mutually exclusive forms of governance. This perspective envisions a spectrum of governing authority that spans from fully institutionalized autocracies through mixed, or incoherent, authority regimes (termed "anocracies") to fully institutionalized democracies.	Polity IV Project
Fixed telephone subscriptions	Number (per 100 people)	Internet users are individuals who have used the Internet (from any location) in the last 12 months. Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.	WDI
Net ODA received per capita	US\$	Net official development assistance (ODA) per capita consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients; and is calculated by dividing net ODA received by the midyear population estimate. It includes loans with a grant element of at least 25 percent (calculated at a rate of discount of 10 percent).	WDI
Personal remittances, received	% of GDP	Personal remittances comprise personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by nonresident entities. Data are the sum of two items defined in the sixth edition of the IMF's Balance of Payments Manual: personal transfers and compensation of employees.	WDI
Foreign direct investment, net inflows	% of GDP	Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.	WDI
Governance Index	Index	First Principal Component of the following three indicators: Bureaucracy Quality, Corruption and Law and Order	ICRG

Table A4.5: Real GDP Characteristics of Countries that Experienced Mass Political Instability

Albania

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	1,835.0	1,745.9
Consumption	97.0	88.8
GCF	22.3	24.0
Exports	13.8	23.1
Imports	33.0	35.9
School Enrollment	81.3	56.2
Polity2	-1.9	0.6

Synthetic Control: Bulgaria (0.007); Burundi (0.291); Georgia (0.096); Mongolia (0.352); Peru (0.254).

Bolivia

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	1,489.3	1,496.5
Consumption	89.1	88.8
GCF	16.2	16.3
Exports	21.4	27.4
Imports	26.6	32.4
Net Fuel Exports	3.2	2.6
School Enrollment	78.0	44.4
M2	36.7	32.5
Polity2	8.9	2.3

Synthetic Control: El Salvador (0.243); Ghana (0.106); Madagascar (0.171); Nigeria (0.164); Panama (0.01); Philippines (0.266); Togo (0.04).

Bahrain

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	21,914.3	21,794.2
Consumption	63.2	67.9
GCF	21.9	26.3
Exports	77.9	62.7
Imports	62.9	56.8
Net Fuel Exports	16.2	17.2
School Enrollment	100.1	85.2
M2	68.6	56.4
Polity2	-7.8	-3.6

Synthetic Control: Azerbaijan (0.13); Belarus (0.255); Malaysia (0.174); Oman (0.088); Saudi Arabia (0.074); Switzerland (0.087); United Arab Emirates (0.192).

Chile

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	4,181.5	4,191.2
Consumption	82.9	82.9
GCF	17.7	17.7
Exports	13.2	13.2
Imports	13.8	13.8
Net Fuel Exports	-0.8	1.4
School Enrollment	52.8	27.0
M2	16.7	20.5
Polity2	5.7	1.7

Synthetic Control: Australia (0.035); Chad (0.219); Ecuador (0.021); Ghana (0.111); India (0.352); Madagascar (0.007); Mauritania (0.077); Senegal (0.01); United States (0.074); Venezuela, RB (0.094).

Table A4.5 (continued): Real GDP Characteristics of Countries that Experienced Mass Political Instability

Egypt, Arab Rep.

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	2,116.8	2,139.3
Consumption	85.5	85.6
GCF	19.8	19.9
Exports	23.4	23.5
Imports	28.7	28.8
Net Fuel Exports	2.3	0.5
School Enrollment	75.7	42.6
M2	85.9	54.4
Polity2	-5.1	-0.6

Synthetic Control: Bolivia (0.177); Canada (0.01); Central African Republic (0.239); China (0.213); Djibouti (0.031); Guinea-Bissau (0.099); Kazakhstan (0.01); Oman (0.026); Rwanda (0.086); Zimbabwe (0.11).

Fiji

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	3,167.8	3,174.1
Consumption	84.2	87.3
GCF	17.9	16.8
Exports	56.3	39.6
Imports	58.4	43.7
Net Fuel Exports	-6.3	-1.6
School Enrollment	78.0	42.4
M2	46.8	43.2
Polity2	4.5	3.2

Synthetic Control: Canada (0.009); El Salvador (0.175); Malaysia (0.153); Namibia (0.322); Senegal (0.113); Sierra Leone (0.228).

Georgia

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	1,484.1	1,536.0
Consumption	101.4	96.1
GCF	20.1	20.9
Exports	27.9	34.4
Imports	49.3	51.3
Net Fuel Exports	-5.0	6.5
School Enrollment	81.3	81.2
M2	8.4	23.8
Polity2	4.7	-1.2

Synthetic Control: Armenia (0.409); Azerbaijan (0.554); Mozambique (0.038).

Guinea

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	409.7	409.6
Consumption	82.5	90.9
GCF	19.5	18.9
Exports	26.9	18.5
Imports	28.8	28.2
Net Fuel Exports	-3.7	-3.7
School Enrollment	17.5	26.9
Polity2	-3.2	1.1

Synthetic Control: Burkina Faso (0.045); Nepal (0.54); Niger (0.369); Papua New Guinea (0.008); Tajikistan (0.038).

Table A4.5 (continued): Real GDP Characteristics of Countries that Experienced Mass Political Instability

Haiti		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	747.1	758.7
Consumption	95.3	95.3
GCF	27.1	24.5
Exports	12.5	13.3
Imports	35.0	33.3
M2	39.1	39.0
Polity2	0.2	0.2

Synthetic Control: Argentina (0.042); Bangladesh (0.171); Bhutan (0.013); Eritrea (0.136); Mozambique (0.264); Uganda (0.373).

Iran, Islamic Rep.		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	4,670.4	4,719.6
Consumption	65.1	63.1
GCF	65.1	63.1
Exports	21.0	24.7
Imports	20.8	20.7
Net Fuel Exports	14.6	10.2
School Enrollment	70.5	59.8
M2	43.8	81.7
Polity2	-3.0	-3.0

Synthetic Control: Algeria (0.278); Australia (0.03); China (0.493); India (0.052); Sudan (0.051); Venezuela, RB (0.097).

Honduras		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	1,770.4	1,776.9
Consumption	83.1	78.1
GCF	28.8	28.3
Exports	45.6	39.6
Imports	57.6	46.1
Net Fuel Exports	-8.0	-2.7
School Enrollment	47.9	48.6
M2	41.9	40.9
Polity2	6.4	-0.3

Synthetic Control: Bhutan (0.259); China (0.089); Gambia (0.187); Guatemala (0.039); Malaysia (0.021); Moldova (0.13); Paraguay (0.274).

Italy		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	25,818.5	25,862.6
Consumption	76.6	76.2
GCF	76.6	76.2
Exports	19.3	18.8
Imports	19.5	18.9
Net Fuel Exports	-3.2	-1.5
School Enrollment	72.2	80.0
Polity2	10.0	6.3

Synthetic Control: France (0.356); Ghana (0.179); Japan (0.237); Norway (0.134); United States (0.054); Uruguay (0.04).

Table A4.5 (continued): Real GDP Characteristics of Countries that Experienced Mass Political Instability

Jordan		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	3,429.8	3,469.8
Consumption	98.7	86.6
GCF	27.5	27.6
Exports	50.1	60.6
Imports	76.3	74.7
Net Fuel Exports	-10.2	-9.3
School Enrollment	86.0	67.9
M2	118.5	81.9

Synthetic Control: Synthetic Control: China (0.138); Djibouti (0.21); Grenada (0.086); Guyana (0.356); Hong Kong SAR, China (0.045); Moldova (0.13); Zimbabwe (0.035).

Kyrgyz Republic		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	744.3	755.4
Consumption	93.1	94.5
GCF	19.9	19.3
Exports	35.7	32.4
Imports	46.0	46.3
School Enrollment	91.4	35.3
M2	15.9	23.0
Polity2	-3.0	0.0

Synthetic Control: Chad (0.127); Equatorial Guinea (0.004); Gambia (0.348); Lesotho (0.009); Moldova (0.237); Rwanda (0.065); Togo (0.21).

Kenya		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	872.1	873.4
Consumption	82.0	85.4
GCF	82.0	85.4
Exports	27.5	27.2
Imports	31.0	34.4
M2	32.0	22.9
Polity2	-6.2	-6.1

Synthetic Control: Bhutan (0.247); Botswana (0.016); Cameroon (0.152); Honduras (0.062); Mauritania (0.066); Philippines (0.016); Saudi Arabia(0.003); Sierra Leone (0.363); Togo (0.076).

Morocco		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	2,259.8	2,255.3
Consumption	76.9	76.8
GCF	29.2	29.2
Exports	27.0	26.9
Imports	33.1	33.0
Net Fuel Exports	-4.8	-1.8
School Enrollment	44.3	47.6
M2	76.5	62.0
Polity2	-6.5	-0.1

Synthetic Control: Algeria (0.026); Bhutan (0.169); China (0.146); Djibouti (0.036); India (0.306); Moldova (0.012); Mozambique (0.01); Rwanda (0.004); Suriname (0.059); Switzerland (0.009); Togo (0.092); Zimbabwe (0.13).

Table A4.5 (continued): Real GDP Characteristics of Countries that Experienced Mass Political Instability

Nigeria

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	1,511.3	1,541.1
Consumption	72.6	84.6
GCF	22.8	18.5
Exports	23.8	24.5
Imports	17.3	27.7
Net Fuel Exports	29.3	-0.3
School Enrollment	18.9	15.3
M2	23.6	23.6
Polity2	-3.0	-6.7

Synthetic Control: Argentina (0.036); China (0.031); Cote d'Ivoire (0.332); Gabon (0.003); Iran, Islamic Rep. (0.086); Niger (0.511).

Paraguay

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	2,624.7	2,634.7
Consumption	73.4	86.7
GCF	21.0	20.9
Exports	55.1	40.0
Imports	49.6	47.7
Net Fuel Exports	-3.0	-2.5
School Enrollment	33.7	35.0
M2	24.1	26.9

Synthetic Control: Belize (0.174); Ecuador (0.012); Gambia (0.552); Iceland (0.045); Indonesia (0.18); Panama (0.037).

Pakistan

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	713.9	711.9
Consumption	88.7	87.3
GCF	18.8	18.8
Exports	13.9	14.3
Imports	21.3	20.5
Net Fuel Exports	-3.6	-1.8
School Enrollment	19.9	23.3
M2	42.7	29.7
Polity2	1.2	-2.6

Synthetic Control: Bangladesh (0.456); Benin (0.113); China (0.159); Gambia (0.061); Japan (0.006); Sierra Leone (0.204).

Peru

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	3,253.1	3,227.7
Consumption	70.8	81.7
GCF	21.2	22.0
Exports	17.4	22.3
Imports	9.5	26.0
Net Fuel Exports	1.1	-0.5
School Enrollment	65.8	52.9
M2	24.7	44.5
Polity2	4.4	1.5

Synthetic Control: Bolivia (0.038); Burkina Faso (0.156); China (0.105); Nicaragua (0.305); South Africa (0.395).

Table A4.5 (continued): Real GDP Characteristics of Countries that Experienced Mass Political Instability

Philippines

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	1,390.3	1,459.6
Consumption	76.2	85.1
GCF	26.0	19.3
Exports	20.6	22.0
Imports	22.9	26.3
Net Fuel Exports	-3.8	-2.7
School Enrollment	54.7	48.6
M2	24.3	25.5
Polity2	-3.1	3.8

Synthetic Control: Ghana (0.125); India (0.063); Korea, Rep. (0.08); Peru (0.1); Sri Lanka (0.59); Uruguay (0.042).

Spain

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	13,491.5	13,450.5
Consumption	74.3	73.5
GCF	28.2	29.2
Exports	10.7	16.2
Imports	13.1	19.1
Net Fuel Exports	-1.7	-2.5
School Enrollment	63.3	83.5
Polity2	-5.7	6.8

Synthetic Control: Finland (0.238); France (0.018); Israel (0.017); Japan (0.319); Korea, Rep. (0.267).

Portugal

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	7,698.4	7,758.6
Consumption	77.5	52.7
GCF	28.7	19.6
Exports	19.5	25.2
Imports	24.3	-1.4
Net Fuel Exports	-1.5	32.7
School Enrollment	42.0	0.0
Polity2	-8.6	5.0

Synthetic Control: Algeria (0.006); Congo, Rep. (0.082); Israel (0.102); Japan (0.351); Korea, Rep. (0.304); Malaysia (0.149); Thailand (0.007).

Thailand

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	3,317.6	3,314.2
Consumption	67.7	66.5
GCF	31.3	29.4
Exports	46.1	48.4
Imports	45.1	44.3
Net Fuel Exports	-3.8	4.3
School Enrollment	48.0	52.3
M2	90.3	78.1
Polity2	6.7	-1.0

Synthetic Control: China (0.156); Ghana (0.005); Guinea-Bissau (0.046); Indonesia (0.449); Malaysia (0.339); Papua New Guinea (0.005).

Table A4.5 (continued): Real GDP Characteristics of Countries that Experienced Mass Political Instability

Togo		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	514.2	540.8
Consumption	94.5	93.6
GCF	16.1	17.0
Exports	36.0	25.5
Imports	46.6	36.0
Net Fuel Exports	-6.5	-2.7
School Enrollment	26.0	25.6
M2	31.1	19.7
Polity2	-3.9	-1.2

Synthetic Control: Benin (0.003); Burundi (0.007); Congo, Rep. (0.023); Ghana (0.142); Jordan (0.004); Malawi (0.756); Senegal (0.066).

Turkey		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	7,665.3	7,625.7
Consumption	80.3	79.7
GCF	21.8	21.2
Exports	19.7	20.9
Imports	21.8	21.8
Net Fuel Exports	-2.7	1.6
School Enrollment	66.1	72.0
M2	33.2	33.3
Polity2	7.6	7.0

Synthetic Control: Argentina (0.214); China (0.007); Colombia (0.474); Guinea-Bissau (0.052); India (0.007); Korea, Rep. (0.108); Moldova (0.048); Sweden (0.032); Trinidad and Tobago (0.035); Venezuela, RB (0.023).

Tunisia		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	3,287.7	3,298.7
Consumption	78.3	78.2
GCF	25.2	25.1
Exports	43.5	43.5
Imports	47.0	46.9
Net Fuel Exports	-0.7	1.4
School Enrollment	71.3	66.0
M2	51.3	53.3
Polity2	-3.7	5.2

Synthetic Control: Belarus (0.041); Bhutan (0.072); Bolivia (0.188); Botswana (0.059); Congo, Rep. (0.054); Guinea-Bissau (0.037); Honduras (0.081); India (0.067); Malaysia (0.02); Mauritius (0.232); Mozambique (0.001); Sri Lanka (0.007); Swaziland (0.001); Trinidad and Tobago (0.027); Zimbabwe (0.049).

Ukraine		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	2,095.2	2,051.8
Consumption	76.1	77.1
GCF	22.5	23.0
Exports	51.2	47.5
Imports	49.8	47.4
Net Fuel Exports	-13.5	1.8
School Enrollment	100.2	66.7
M2	22.2	24.2
Polity2	6.5	2.4

Synthetic Control: Congo, Rep. (0.149); India (0.251); Mongolia (0.087); Russian Federation (0.172); Tajikistan (0.342).

Table A4.5 (continued): Real GDP Characteristics of Countries that Experienced Mass Political Instability

Yemen

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	1,183.9	1,181.6
Consumption	86.6	91.3
GCF	19.2	19.3
Exports	30.7	26.2
Imports	36.6	36.7
M2	36.8	29.9
Polity2	-2.3	-1.8

Synthetic Control: Algeria (0.002); Cameroon (0.074); Mozambique (0.131); Norway (0.003); Pakistan (0.218); Rwanda (0.013); Sudan (0.015); Swaziland (0.122); Tanzania (0.275); Togo (0.074); Zimbabwe (0.074).

Table A4.6: The Average Change in GDP Components During the Event Year

	Group 1	Group 2	Group 3	Group 4
Diff. Recovery	0.53	-5.40	-1.87	-6.22
Change in GCF/GDP	0.80	-2.75	-1.22	-3.71
Change in Gov. Cons./GDP	0.50	0.60	0.47	0.00
Change in Priv. Cons./GDP	3.10	3.15	2.52	2.33
Change in NX/GDP	-4.50	-1.05	-1.77	1.39

Source: Author's own calculations. The unit for each variable is a percentage point difference.

Table A4.7: DiD estimates of Mass Political Instability

Country	β_3	β_4	Obs.	R².
Albania	-15.69**	12.78	36	0.28
Bahrain	-5.33***	1.35	46	0.27
Bolivia	-15.26***	-7.12	54	0.63
Chile	-12.35***	-17.52***	38	0.41
Egypt, Arab Rep.	-7.82	-7.5	52	0.46
Fiji	-6.81*	-0.25	44	0.60
Georgia	-31.51*	-8.28	34	0.54
Guinea	-11.1***	-11.16***	54	0.62
Haiti	-22.56***	-20.76***	24	0.76
Honduras	-18.68***	-12.5**	54	0.66
Iran, Islamic Rep.	-3.9	2.49	48	0.39
Italy	-4.83	-1.51	54	0.44
Jordan	-12.93**	-13.81**	52	0.41
Kenya	-8.38***	-8.83***	44	0.41
Kyrgyz Republic	-9.1	2.27	48	0.04
Morocco	-9.19	-3.99	52	0.53
Nigeria	-2.44	-4.7	54	0.22
Pakistan	-12.62**	-8.13	54	0.45
Paraguay	-13.28***	-19.56***	54	0.38
Philippines	-23.37***	-29.95***	54	0.38
Portugal	-16.22	-5.41	42	0.46
Spain	-12.46	-12.09	48	0.39
Thailand	-5.16	0.61	50	0.33
Tunisia	-12.8*	-8.6	52	0.41
Turkey	-5.75	-4.12	54	0.61
Ukraine	-12.66*	-2.01	34	0.78
Yemen, Rep.	-22.73***	-22.18***	48	0.22

Source: Author's own calculations. Note: The first two columns include the estimated coefficients β_3 and β_4 resulting from the diff-in-diff models in equation (4.8). *, **, *** indicate significance levels of 10%, 5%, and 1%, respectively. Robust standard errors are used.

Table A4.8: List of Political Regime Crises without Mass Civil Protest

Country	Year*	Event	Mass Civil Protests			Instability of the Political Regime		
			Riots	Strikes	Demonstrations	Gov. Crisis	Const. Changes	Coup
Angola	2010	Change of constitution in favor of the president	no	no	no	no	yes	no
Australia	1975	Constitutional crisis	no	no	no	yes	no	no
Ecuador	2010	Failed attempted coup	no	no	no	yes	no	no
Estonia	2002	PM resigns falling out among the three parties of the ruling coalition	no	no	no	yes	no	no
Gambia	1994	President Jawara was ousted in a coup led by Yahya Jammeh	no	no	no	no	yes	yes
Ghana	1979	President Akuffo deposed in a coup led by Lieutenant Jerry Rawlings	no	no	no	no	yes	yes
Malaysia	1988	1988 judicial crisis	no	no	no	yes	no	no
Niger	2010	Military coup ousts president Mamadou Tandja	no	no	no	no	yes	yes
Qatar	1995	Sheikh Khalifa deposed by his son in a bloodless coup	no	no	no	no	yes	no
Slovak Republic	2011	Ruling coalition collapses after EU bailout vote	no	no	no	yes	no	no

* CNTS database and cross-checked with online news sources.

Table A4.9: Real GDP Characteristics of Countries that Only Experienced Political Regime Crises

Angola		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	2,689.8	2,712.1
Consumption	67.8	74.2
GCF	22.2	22.6
Exports	68.9	47.4
Imports	58.9	44.1
School Enrollment	16.1	53.7
M2	23.3	23.5
Polity2	25.9	24.6

Synthetic Control: Azerbaijan (0.378); Congo, Rep. (0.28); Djibouti (0.093); Niger (0.179); Nigeria (0.034); Oman (0.037).

Ecuador		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	4,049.8	4,052.2
Consumption	78.8	78.8
GCF	22.2	22.2
Exports	24.6	24.8
Imports	25.7	25.9
Net Fuel Exports	8.0	5.0
School Enrollment	58.8	63.5
M2	22.0	32.4
Polity2	7.4	6.0

Synthetic Control: Argentina (0.006); Bangladesh (0.001); Colombia (0.508); Congo, Rep. (0.052); Gabon (0.059); India (0.146); Madagascar (0.049); Mexico (0.031); Moldova (0.022); Mozambique (0.041); Ukraine (0.085).

Australia		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	23,706.5	23,905.3
Consumption	68.8	68.8
GCF	31.7	29.0
Exports	13.1	27.4
Imports	13.6	25.4
School Enrollment	80.8	74.2
M2	46.2	46.3
Polity2	10.0	9.4

Synthetic Control: Israel (0.009); Japan (0.016); Norway (0.301); Sweden (0.458); Venezuela, RB (0.216).

Estonia		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	4,181.5	4,191.2
Consumption	82.9	82.9
GCF	17.7	17.7
Exports	13.2	13.2
Imports	13.8	13.8
Net Fuel Exports	-0.8	1.4
School Enrollment	52.8	27.0
M2	16.7	20.5
Polity2	5.7	1.7

Synthetic Control: Bulgaria (0.27); Congo, Rep. (0.059); Equatorial Guinea (0.037); Ireland (0.129); Jordan (0.011); Lithuania (0.182); Malaysia (0.119); Panama (0.192).

Table A4.9 (continued): Real GDP Characteristics of Countries that Only Experienced Political Regime Crises

Gambia		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	524.2	522.3
Consumption	94.0	89.4
GCF	17.6	19.8
Exports	42.5	24.9
Imports	54.1	34.1
Net Fuel Exports	-4.3	-3.2
School Enrollment	15.2	15.8
M2	22.4	25.6
Polity2	7.6	-6.6

Synthetic Control: Burundi (0.256); Egypt, Arab Rep. (0.059); Guyana (0.013); Malawi (0.388); Papua New Guinea (0.078); Sierra Leone (0.084); Togo (0.12).

Malaysia		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	2,957.3	2,980.7
Consumption	71.4	79.2
GCF	25.3	25.4
Exports	49.7	42.2
Imports	46.5	46.9
Net Fuel Exports	3.2	2.6
M2	75.1	33.6
Polity2	4.3	2.1

Synthetic Control: Algeria (0.087); China (0.02); India (0.031); Indonesia (0.163); Singapore (0.127); Sri Lanka (0.522); Trinidad and Tobago (0.068).

Ghana		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	1,014.5	1,014.6
Consumption	89.1	93.6
GCF	13.5	11.1
Exports	18.9	16.9
Imports	21.4	21.6
Net Fuel Exports	-2.0	-1.3
School Enrollment	38.3	16.8
M2	22.0	18.1
Polity2	-5.8	-2.2

Synthetic Control: Guyana (0.033); Madagascar (0.853); Peru (0.114).

Niger		
Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	345.2	361.2
Consumption	94.8	99.9
GCF	15.0	15.1
Exports	16.8	15.6
Imports	26.5	30.6
Net Fuel Exports	-3.3	-3.2
School Enrollment	7.9	15.3
M2	14.1	21.3
Polity2	2.5	2.7

Synthetic Control: Burundi (0.519); Madagascar (0.417); Senegal (0.064).

Table A4.9 (continued): Real GDP Characteristics of Countries that Only Experienced Political Regime Crises

Slovak Republic

Averages of GDP per capita Characteristics		
	Actual	Synthetic Control
Real GDP per capita	12,595.0	12,428.9
Consumption	75.3	73.6
GCF	28.6	27.5
Exports	63.6	58.9
Imports	67.4	60.4
Net Fuel Exports	-4.4	1.9
School Enrollment	89.8	85.5
M2	59.7	60.7
Polity2	8.7	8.6

Synthetic Control: Bulgaria (0.001); Czech Republic (0.487); Guyana (0.14); Hungary (0.001); Lesotho (0.044); Malaysia (0.054); Mauritius (0.001); Sweden (0.006); Trinidad and Tobago (0.262).

Table A4.10: Summary Statistics

	N	mean	sd	min	max
Diff. Recovery	130	-1.174	3.540	-11.38	12.70
Change in GCF/GDP	125	0.287	3.205	-10.80	14.30
Inflation	130	18.11	57.69	-0.900	504.7
Change in Polity2	130	0.531	1.671	-2	10
Change in Exp/GDP	125	0.473	3.564	-12.10	11.50
Change in Imp/GDP	125	0.757	4.664	-14.20	22.20
Change in ODA/Pop	107	5.340	22.14	-54.10	169.5
Change in School Ratio	86	0.840	2.665	-8.400	6.400

Source: Author's own calculations based on the WDI and ICRG databases.

Table A4.11: Regression Results with the Fifth Lag of Per Capita GDP

	(1)	(2)	(3)
Change in GCF/GDP	0.492*** (0.174)	0.554*** (0.192)	0.756*** (0.204)
log(GDP per capita(-5))	-0.169*** (0.056)	-0.152** (0.066)	-0.196* (0.102)
Inflation	0.006 (0.047)	0.009 (0.047)	0.013 (0.061)
Change in Polity2	-0.319** (0.131)	-0.348** (0.153)	-0.319 (0.300)
Change in Exp/GDP	0.030 (0.098)	0.000 (0.109)	-0.029 (0.215)
Change in Imp/GDP	-0.148 (0.108)	-0.159 (0.122)	-0.247** (0.126)
ODA/Pop		0.006 (0.017)	0.061 (0.046)
School			-0.117 (0.202)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	122.0	102.0	73.0

Bootstrapped standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Notes: In all the specifications, the dependent variable is the yearly change in the percentage difference between actual and synthetic GDP per capita. The (-5) represents the fifth lag of the corresponding variable.

Table A4.12: Regression results after excluding Kenya, the Philippines and Yemen

	(1)	(2)	(3)
Change in GCF/GDP	0.382** (0.162)	0.454** (0.192)	0.740** (0.328)
log(GDP per capita(-1))	-0.225*** (0.040)	-0.213*** (0.052)	-0.172* (0.102)
Inflation	0.009 (0.034)	0.011 (0.036)	-0.000 (0.079)
Change in Polity2	-0.280* (0.153)	-0.430** (0.169)	-0.247 (0.527)
Change in Exp/GDP	-0.008 (0.086)	-0.043 (0.101)	-0.007 (0.206)
Change in Imp/GDP	-0.148 (0.091)	-0.154 (0.105)	-0.293* (0.173)
Change in ODA/Pop		0.010 (0.013)	0.044 (0.041)
Change in School Ratio			-0.069 (0.163)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	112.0	92.0	58.0

Bootstrapped standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Notes: In all the specifications, the dependent variable is the yearly change in the percentage difference between actual and synthetic GDP per capita. The (-1) represents the first lag of the corresponding variable.

Table A4.13: Regressions when Specific Countries Are Excluded From the Sample

	Panel-I			Panel-II		
	(1)	(2)	(3)	(4)	(5)	(6)
Change in GCF/GDP	0.437*** (0.162)	0.549*** (0.190)	0.817** (0.333)	0.448*** (0.163)	0.517*** (0.184)	0.789*** (0.305)
log(GDP per capita(-1))	-0.262*** (0.053)	-0.248*** (0.062)	-0.197* (0.113)	-0.249*** (0.053)	-0.237*** (0.058)	-0.209* (0.114)
Inflation	-0.024 (0.043)	-0.028 (0.051)	-0.006 (0.075)	0.007 (0.038)	0.008 (0.044)	-0.008 (0.060)
Change in Polity2	-0.310* (0.177)	-0.383** (0.166)	-0.364 (0.524)	-0.392*** (0.116)	-0.437*** (0.099)	-0.326* (0.197)
Change in Exp/GDP	-0.040 (0.122)	-0.122 (0.144)	-0.036 (0.237)	-0.032 (0.089)	-0.058 (0.107)	-0.035 (0.192)
Change in Imp/GDP	-0.137 (0.097)	-0.161 (0.111)	-0.286* (0.162)	-0.152* (0.092)	-0.168 (0.103)	-0.286** (0.136)
Change in ODA/Pop		0.017 (0.016)	0.048 (0.040)		0.014 (0.025)	0.042 (0.040)
Change in School Ratio			-0.131 (0.196)			-0.069 (0.131)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	102.0	82.0	56.0	114.0	96.0	63.0

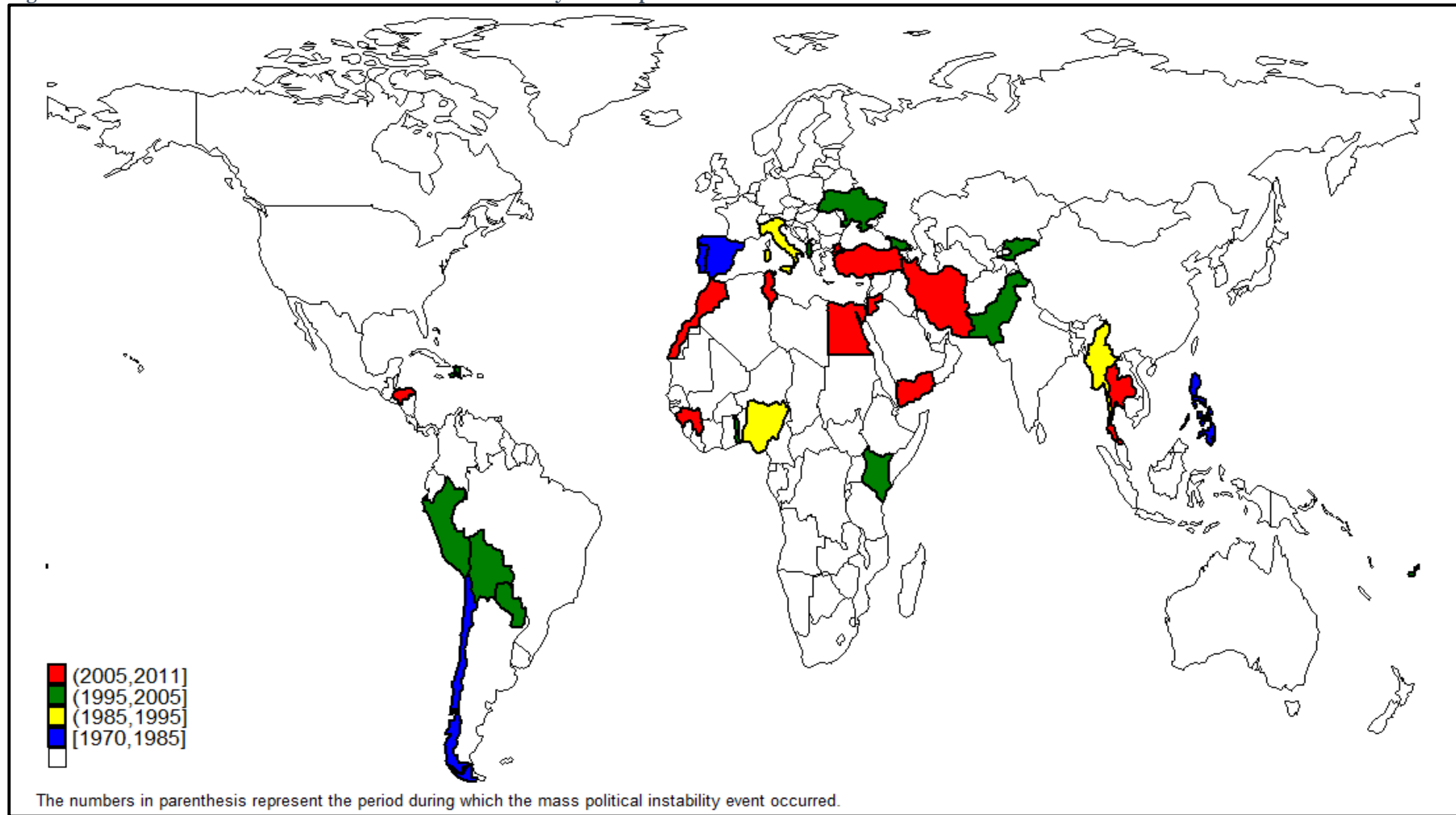
Bootstrapped standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Panel I (II) represents the regression results of the first (second) robustness test after excluding Kenya, Nigeria, Togo and Peru (Egypt and Jordan) from our initial sample. Notes: In all the specifications, the dependent variable is the yearly change in the percentage difference between actual and synthetic GDP per capita. The (-1) represents the first lag of the corresponding variable.

Table A4.14: Regressions after Controlling for Political Instability Events during the Recovery Period

	Panel-I			Panel-II		
	(1)	(2)	(3)	(4)	(5)	(6)
Change in GCF/GDP	0.442*** (0.162)	0.508*** (0.189)	0.775** (0.313)	0.455** (0.187)	0.520** (0.214)	0.820 (0.548)
log(GDP per capita(-1))	-0.241*** (0.051)	-0.232*** (0.061)	-0.220** (0.094)	-0.208*** (0.079)	-0.200** (0.084)	-0.190 (0.237)
Inflation	0.007 (0.038)	0.009 (0.043)	-0.001 (0.063)	0.013 (0.043)	0.015 (0.051)	0.014 (0.191)
Change in Polity2	-0.407*** (0.126)	-0.458*** (0.125)	-0.320 (0.235)	-0.428** (0.182)	-0.536*** (0.185)	-0.456 (0.755)
Change in Exp/GDP	-0.009 (0.091)	-0.035 (0.103)	0.028 (0.214)	-0.014 (0.114)	-0.036 (0.131)	-0.081 (0.638)
Change in Imp/GDP	-0.153* (0.092)	-0.166 (0.104)	-0.285* (0.147)	-0.138 (0.114)	-0.160 (0.132)	-0.261 (0.595)
Mass Pol. Inst.	-0.232 (0.461)	-0.247 (0.639)	-0.959 (1.412)			
Change in ODA/Pop		0.009 (0.015)	0.043 (0.040)		0.015 (0.032)	0.038 (0.151)
Change in School Ratio			-0.076 (0.140)			-0.107 (0.450)
Riots				0.007 (0.233)	0.175 (0.317)	0.693 (2.579)
Strikes				0.091 (0.524)	-0.155 (0.796)	0.085 (7.715)
Demonstrations				-0.223 (0.174)	-0.079 (0.202)	-0.333 (1.071)
Gov. Crisis				0.441 (0.431)	0.689 (0.589)	0.608 (3.052)
Const. Change				0.934 (1.235)	0.576 (1.141)	-0.282 (5.690)
Coup				-0.879 (2.923)	-1.787 (4.174)	-10.671 (41.652)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	122.0	102.0	66.0	112.0	95.0	63.0

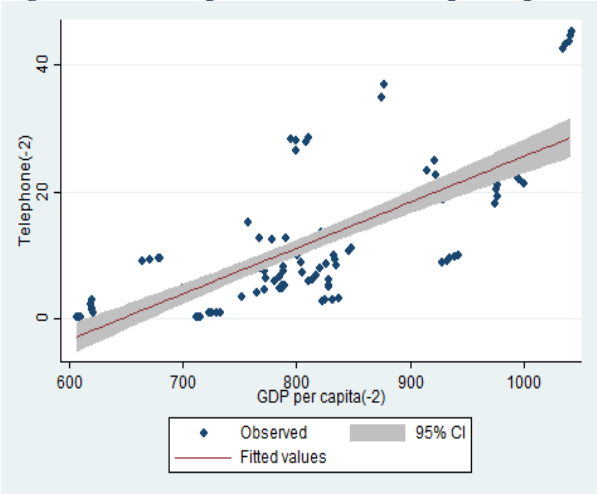
Bootstrapped standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Notes: In all the specifications, the dependent variable is the yearly change in the percentage difference between actual and synthetic GDP per capita. The (-1) represents the first lag of the corresponding variable.

Figure A4.1: Global Distribution of Mass Political Instability Events per Year



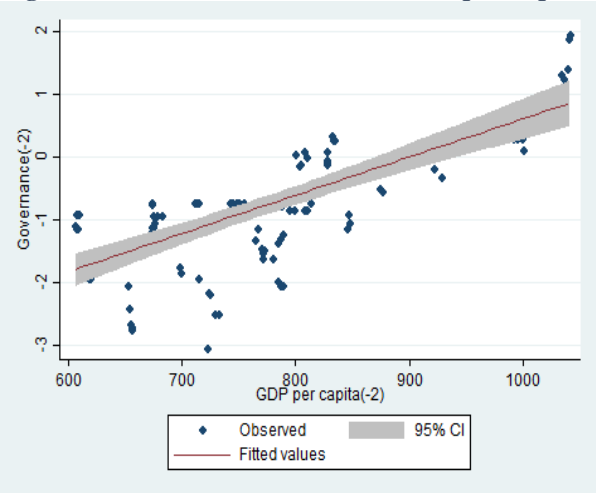
Source: Author's own calculations based on the CNTS database. This map was generated using STATA 13.1.

Figure A4.2: Telephone vs. Real GDP per Capita



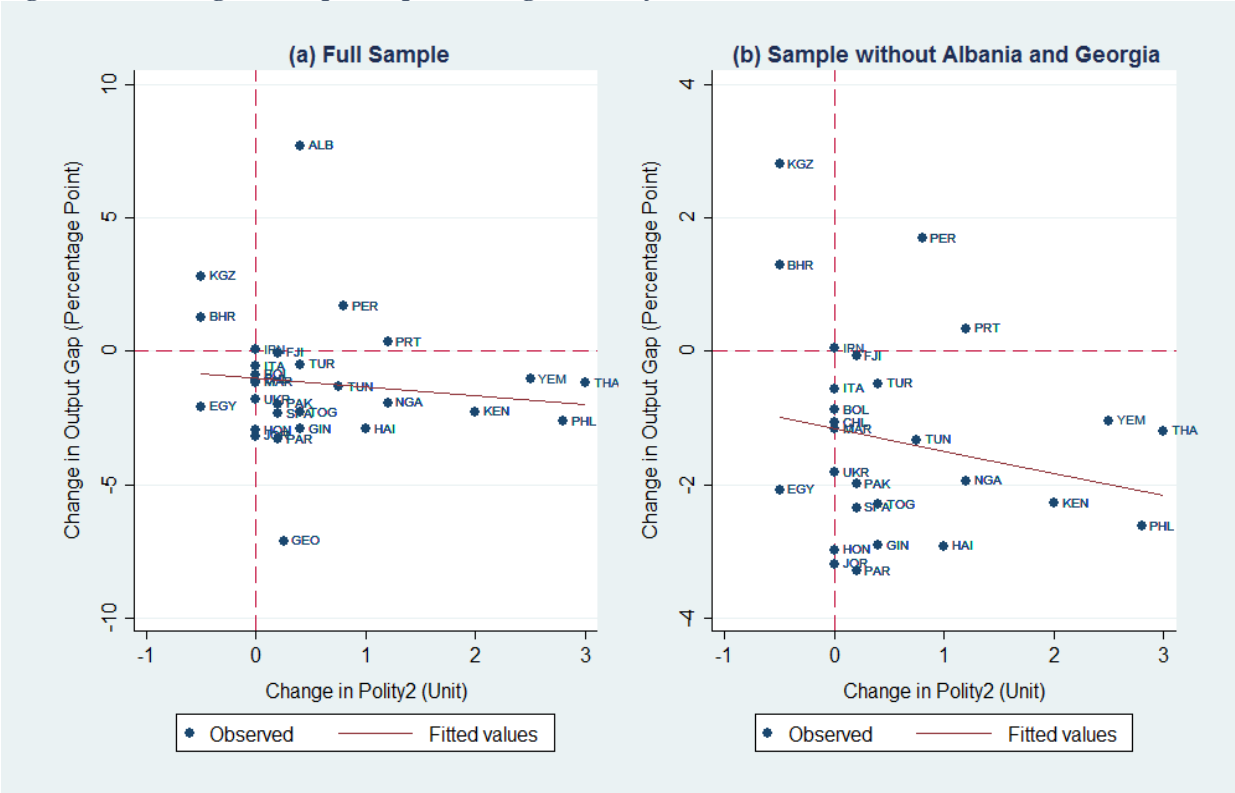
Source: Author's own calculations.

Figure A4.3: Governance vs. Real GDP per Capita



Source: Author's own calculations.

Figure A4.4: Change in Output Gap vs. Change in Polity2



Source: Author's own calculations. Figure (a) presents the relationship between the change in output gap and democratization for the full sample. However, we notice that Albania and Georgia are outliers. Therefore, Figure (b) illustrates this relationship after removing these two countries.

Chapter 5 – Conclusion

This thesis has provided new insights into the economic impact of political instability events, with a focus on the effect of the Arab Spring on the Tunisian economy from both a macro and micro perspective. In this final chapter, we summarize the main research findings, and provide an overview of their limitations together with suggestions for future research avenues.

5.1 Summary of the Main Findings

Chapter 2 of this thesis estimates the effect of the Arab Spring on the Tunisian macro-economy from 2011 to 2013 using the Synthetic Control Methodology (SCM), which was considered by Athey and Imbens (2017) as the most important innovation in the program evaluation literature during the past decade. In particular, SCM has several advantages over conventional empirical methods used in the literature to estimate the economic impact of political upheaval. First, SCM is very well suited for macroeconomic applications where standard time-series econometric models (VAR and VECM) fail because of the small number of observations (such as in our case). Second, this technique outperforms the conventional panel econometric models, because (i) it captures the effects of time-changing unobservable variables, unlike DiD and fixed effects models which only accounts for time-invariant effects (Abadie et al., 2010; Billmeier and Nannicini, 2013), (ii) it enables us to examine the causal impact of political instability on output over time, in contrast to system-GMM, which only allows for evaluating the average treatment effect for the whole sample, and (iii) it allows for a country-by-country assessment of the impact of mass political instability, a feature that proved to be very useful in providing further insights into the heterogeneous effects of political turmoil. Third, in a macro setting, it is hard to find control countries that have, approximately, the same characteristics as the treated one over the entire pre-shock period, meaning that the standard difference-in-difference (DiD) method would lead to biased estimates because the parallel-trend assumption is not satisfied. In fact, counterfactuals

developed using SCM overcome this problem because they provide a better comparison for the country exposed to the shock than any single country alone. Fourth, SCM estimates reliable counterfactuals that capture global economic shocks in the post-treatment period, as opposed to counterfactuals constructed based on pre-shock forecasts or time trends. Overall, this chapter shows that the Arab Spring had a negative effect on the aggregate Tunisian economy with an estimated per capita reduction in output of US\$ 600 (5.5 percent) in 2011, US\$ 574 (5.1 percent) in 2012 and US\$ 735 (6.4 percent) in 2013. These estimates, which are robust to placebo tests and further sensitivity analysis, suggest that most of the adverse impact occurred in the first year, with limited further losses (but also no recovery) in the third year. Our results are consistent with the literature on the growth dividends associated with regime changes, which finds a drop in growth rates during the early years of a political transition (Flores and Nooruddin, 2009; Freund and Jaud, 2014). We also find that the drop in investment was the main channel through which the Tunisian economy was adversely impacted by the Arab Spring.

Extending the analysis to a micro level, chapter 3 explores the impact of the political instability that emerged after the Arab Spring on Tunisian firms. Using the 2013 Tunisian Enterprise Survey, we show that political instability was a major concern for small and exporting firms as well as for those that were operating in the tourism sector, those that have suffered from acts of vandalism or arson and those that were located in the interior region of Tunisia. Most importantly, we find strong evidence that political instability was perceived to be the most damaging constraint to firm growth in Tunisia after the Arab Spring. These results are in line with the political economy literature, which suggests that conflicts and large-scale revolutions have negative effects on firm activity (Abadie and Gardeazabal, 2003; Collier and Duponchel, 2013; Klapper et al., 2013; Pshisva and Suarez, 2010; Shonchoy and Tsubota, 2016).

Finally, by broadening the country coverage to thirty countries around the world, chapter 4 examines the economic implications of mass political instability events, defined as political regime crises accompanied by mass civil protest. In summary, our estimates from the SCM counterfactuals indicate that mass political instability events tend to have, on average, an immediate and permanent adverse impact on a country's per capita income. These results are consistent with the previous research that has examined recoveries following economic crises or large shocks (Cerra and Saxena, 2005, 2008; Hong and Tornell, 2005). Furthermore, these findings suggest that the large adverse effects of the Arab Spring on the Tunisia economy, which we estimated in chapter 2, are indeed consistent as they are very close in magnitude to the average impact of mass political instability events across the world. Nevertheless, and unlike previous studies which only estimated the average economic impact of political instability using panel-regression techniques (Aisen and Veiga, 2013; Alesina and Perotti, 1996; Jong-A-Pin, 2009), we uncover a high degree of heterogeneity in economies' reactions to episodes of mass political instability. We also examine political regime crises not accompanied by mass civil protest and show that these cases have much smaller negative output effects compared to mass political instability events. Moreover, we find that poorer countries and those which invest more experience a faster economic recovery after periods of mass political turmoil. These results are consistent with the neoclassical growth theory (Solow, 1956), and the literature on the relationship between investment and growth and (De Long and Summers, 1991; Mankiw et al., 1992), respectively. On the other hand, we find a negative relationship between democratization and recovery after mass political instability. This result is in line with the regime-type hypothesis advocated by Alesina and Drazen (1991) and supported empirically by Oatley (2003).

5.2 Methodological and Data Limitations

In this sub-section we highlight the main methodological and data limitations that were common across the different empirical analyses undertaken in this thesis.

While in the previous section we summarized the advantages of SCM, it is critical to highlight its limitations given that the main results of chapters 2 and 4 are based on this novel empirical approach. First, the SCM depends on the right criteria being used to match the structural characteristics of the synthetic counterfactual with those of the actual (treated) unit. Features of a country that are not easily quantifiable — such as trade and labour market regulations, tax systems and the relationship between business and the state — cannot be included easily. Second, the reliability of the SCM results depends on the weighted average being an adequate measure of similarity, which will not be the case if the effects of a variable (for example oil prices) are asymmetric. Third, the SCM does not control for idiosyncratic shocks that may have impacted the treated and/or any control country after the shock. In our analyses, we tackled these limitations by (i) using long pre-shock periods, (ii) introducing as many covariates as possible, and (iii) conducting several sensitivity tests which confirmed the robustness of our baseline results in chapters 2 and 4.

Data limitation is another overarching caveat across the three chapters. For instance, in chapter 2, we could not use time series regressions, such as VAR or VECM models, to examine the impact of the Arab Spring on Tunisia because we only had quarterly GDP data from Q1-2000 to Q4-2014. We overcame this problem by running a simple Autoregressive Distributed Lag model which supported our main (SCM) findings that the Arab Spring adversely impacted the Tunisian economy. In chapter 3, we were not able to deal with any potential survivor bias and control for firm fixed effects because we only had a cross-sectional dataset that prevented us from using panel-econometric techniques. Moreover, it would have been ideal to exploit the richness of the ACLED database which contains data about different political instability events in 24 Tunisian governorates. Unfortunately, we were not able to do so because the 2013 Tunisian Enterprise Survey stratified firms according to five regions only, meaning that we did not have much geographical variation. In addition, data limitation affected our analysis in chapter 4, by

preventing us from including other factors such as social and political fragmentation which, from a theoretical perspective, might influence economic recovery after mass political instability events.

Lastly, various endogeneity issues,¹⁶¹ which we do not think affected our results in chapter 2 given that the Arab uprisings were unanticipated ex-ante (Gelvin, 2015) and the Tunisian economy was performing relatively well prior to the Arab Spring (hence mitigating any biases), were common empirical concerns in chapters 3 and 4. In particular, the analysis in chapter 3 could have suffered from potential endogeneity biases stemming from measurement error and reverse causality. First, the political instability variable may have been measured with error as managers might not have considered all the facets of political instability when answering the surveyor's question. Second, a reverse causality bias might have existed, as low-performing firms tend to report more stringent constraints, whereas successful firms have the necessary resources to overcome certain obstacles and improve their business environment. To tackle these issues, we have employed an instrumental variable estimation strategy which confirmed our baseline results that political instability was the major constraint to Tunisian firms after the Arab Spring. Regarding chapter 4, one might argue that political instability events occur as a result of economic recessions, leading to a reverse causality issue. To minimize this potential bias, we have excluded from our sample all the periods of mass political instability that were preceded by economic crises which worsened macroeconomic performance irrespective of any social unrest. An additional challenge to our estimation strategy regarding the determinants of economic recovery after mass political instability was the simultaneity issue, as the causality between worsened economic conditions and recovery could run both directions. Ideally, we would tackle

¹⁶¹ Endogeneity, which occurs when the correlation between an explanatory variable and the error term is different from 0, leads to inconsistent estimators. It can originate from measurement error, reverse causality and/or omitted variables (Verbeek, 2008).

this concern by instrumenting each regressor with an exogenous variable, however we could not find credible instruments. Moreover, we were not able to employ the system-GMM, which has been used extensively in the literature to deal with endogeneity, because the number of time periods available in our panel was relatively small.

5.3 Future Research Avenues

The analysis undertaken in this thesis suggests several avenues for further research. In general, scholars are encouraged to explore which sectors and groups within an economy are more resilient to political instability shocks. When it comes to the Arab Spring, it would be valuable to examine what impact the uprisings had on headcount poverty, inequality, females and youth. This line of research could help policy makers develop better tools to alleviate the impact of these revolutions from a socio-economic perspective. Moreover, there is a need to assess the labour market implications of hosting Syrian refugees in Jordan, Lebanon and Turkey in order to turn this challenge into an opportunity to both, refugees and local communities. Furthermore, it would be interesting to study which factors caused the Arab uprisings and evaluate whether these issues are still persisting five years later. From a political standpoint, research is needed to understand why Tunisia and Egypt (to some extent) successfully transited from autocratic to democratic regimes, while Libya, Syria and Yemen degenerated into full-fledged armed conflicts.

From an empirical perspective, there is a need to collect more objective data about political instability events. In that spirit, the ACLED database can be expanded beyond war-torn countries, because this expansion would enable researchers to examine, more accurately, the economic and social effects of mass political instability events that do not necessarily entail armed conflicts. In addition, having objective measures about political instability events would mitigate potential measurement error biases, hence improving future empirical analyses. Finally, there is a need to develop a systematic theoretical model that explains the factors responsible for economic recovery following political instability.

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