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Abstract

We use Synthetic Control Methodology to estimate the output loss in Tunisia as a result of the "Arab spring". Our results suggest that each Tunisian citizen lost, on average, an estimated US$ 600 (5.5 percent of GDP), US$ 574 (5.1 percent of GDP) and US$ 735 (6.4 percent of GDP) in 2011, 2012 and 2013, respectively. These findings are robust to a series of tests. Investment was the main channel through which the economy was impacted by the Arab Spring, as investors were afraid to invest in a highly volatile political environment.

JEL Classification: C31, D74, F62, O11

Keywords: Arab Spring, Tunisia, Economic Impact, Synthetic Control Methodology

Centre for Research in Economic Development and International Trade, University of Nottingham

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Outline

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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, a feeling of discontent and frustration built over the years among citizens, especially the youth. The Arab Spring, termed 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.[1] The Arab Spring was sparked on December 17, 2010 when Mohamed Bouazizi, a Tunisian fruit vendor, immolated himself after the police confiscated his vegetable cart and humiliated him. This event was the catalyst that fueled major protests in Tunisia toppling Zine El Abidine Ben-Ali's 24 years reign on January 2011. The winds of change that swept across Tunisia triggered a domino effect in several Arab countries such as Bahrain, Egypt, Libya, Syria and Yemen among others.

In this paper, we examine the macroeconomic impact of the Arab Spring on the Tunisian economy from 2011 to 2013. Notwithstanding the worldwide interest in the Arab Spring, to the best of our knowledge there are no studies that have quantified its impact on the Tunisian (or any other) economy, apart from one study of Lebanon (World Bank, 2013). This paper builds upon the recent literature which employs Synthetic Control Methodology to estimate the impact of treatments (or shocks) that happen at a macroeconomic level (Abadie and Gardeazabal (2003); Abadie et al. (2010); Billmeier and Nannicini (2013), Campos et. al (2014) and Abadie et al. (2015)) and also contributes to the literature that quantifies the economic impact of conflicts and revolutions (Organski and Kugler (1977); Alesina and Perotti (1996); Collier (1999); Collier and Hoeffler (2004); Hoeffler and Reynal-Querol (2003)).

The synthetic control method developed by Abadie and Gardeazabal (2003) aims at creating a synthetic control (counterfactual) as a weighted average of other control units (countries, states or regions) that were not affected by the treatment (shocks, events or interventions), such that the outcome and characteristics of the treated unit and its synthetic counterpart are almost the same during the pre-shock period. In our context we construct a Synthetic (or artificial) Tunisia, our counterfactual for Tunisia in the absence of the Arab Spring, using country-level panel data from the World Development Indicators (WDI) between 1990 and 2010. After omitting countries exposed to exogenous shocks after 2011, we have a set of 114 of control countries for whom data is available.

The main results of this paper 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 of GDP), US$ 574 (5.1 percent of GDP) and US$ 735 (6.4 percent of GDP) in 2011, 2012 and 2013, respectively. In addition, the main channel through which the Arab Spring adversely impacted the Tunisian economy was through investment, as it increased

[1] "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).

uncertainty about the political, legal and economic environment which in turn may have induced investors to postpone investment decisions.

To assess the robustness of our results, we perform various additional tests. First, we check if the results obtained using Synthetic Tunisia are sensitive to the omission of any particular country that was assigned a non-zero weight in the baseline Synthetic Tunisia. 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 time series falsification tests by replicating the synthetic control analysis for years earlier than 2011 (2000 and 2008) in which the Tunisian economy did not actually experience any structural change. We find that our results are robust as Tunisia's per capita GDP did not drop relative to its synthetic counterpart in after 2000 and 2008. We also compare our results with alternatives based on regression analysis.

The remainder of this paper is structured as follows. Section 2 presents the main political developments that happened in Tunisia in the aftermath of the Arab Spring. Section 3 briefly reviews the relevant literature on the economic cost of conflicts. Section 4 describes the empirical methodology and the data used while section 5 presents the results. This is followed by section 6 which includes some robustness checks and section 7 which determines the main channel through which the economy was impacted by the Arab Spring. Finally, section 8 concludes.

2. Major Political Developments in Tunisia since the Arab Spring

The Tunisian revolution[2] that toppled Ben Ali's regime was ignited by the self-immolation of Mr. Mohammed Bouazizi on December 17, 2010. Since then, Tunisia's political transition experienced three distinct periods as documented by Kerrou (2013). 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, 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 El-Nahda party. For example, in August 2012, thousands protested in Tunis (Capital of Tunisia) against the cabinet's decision to reduce women's rights. The tension intensified, however, in the aftermath of the assassination of Chokri Belaïd, an important 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.

[2] The Tunisian revolution is also referred to as the "Jasmine" revolution.

The third and final period was characterized by the ending of the political crisis and building the foundations of 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 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 Enahda 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 the presidential elections against Mouncef Al-Marzouki.

3. Literature Review

Dating back to the 19th and 20th centuries, researchers have been interested in understanding the relation between economic dynamics and conflict. For example, Von Clausewitz (1812) focused primarily on the relation between economic conditions and the capacity to carry a war while Lenin (1916) looked at the relation between fragile economic fundamentals and the probability of a conflict. Research in this field is divided into two closely related categories: (i) the causes/correlates of conflicts[3] and (ii) the economic consequences of conflicts. For the purpose of this paper, we will briefly review the literature on the latter.[4]

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.[5]

The cost accounting method is based on summing all the direct and indirect costs of conflicts. Examples are Bilmes and Stiglitz (2006) who used it to estimate the economic cost of the Iraqi war for the United States, and Arunatilake et al. (2011) for the Sri Lanka civil war from 1984 to 1996. Regression methods have been applied in various ways. Venieris and Gupta (1986) and Alesina and Perotti (1996) use cross-country regressions to investigate the effect of measures of social and political instability on savings and investment ratios, respectively. Cross-country panel

[3] 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 (Civil War, 2010) and chapter 3 of Collier and Hoeffler (Civil War, 2007).

[4] For more details about the literature tackling the causes of civil wars, the reader is referred to Sambanis (2001), Collier and Hoeffler (2004), Fearon (2004), Sambanis and Hegre (2006), Buhaug and Gleditsch (2008) and Bleaney and Dimico (2011) among others.

[5] An extensive review of the different techniques is provided by Gardeazabal (2010).

data have been used by Collier (1999), Blomberg et al. (2004) and Hoeffler and Reynal-Querol (2003) to estimate the impact of conflict on GDP growth. Time series methods such as Vector Autoregression (VAR) models have been employed by Enders and Sandler (1991) to estimate the impact of transnational terrorist attacks on the number of tourist arrivals in Spain between 1970 and 1988, and by the World Bank (2013) to model the impact of the Syrian conflict (captured by an exogenous dummy variable) on total consumption and investment in Lebanon between 2012 and 2014.

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 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 analyzed the economic costs of the conflict of 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.

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, and after that we describe the data.

4.1 Theoretical Basis

The SCM, as developed by Abadie and Gardeazabal (2003) and Abadie et al. (2010),[6] 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 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 from 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 GDP of the real Tunisia ($GDP_{tun;t}$) and of a Synthetic Tunisia ($GDP_{syn;t}$), constructed as described below, are compared for the period after the Arab Spring, and the impact in each year is measured as the difference between them.

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

The GDP 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 $r \in R$. 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

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

and

$$\sum_{r=1}^{R} w_r^* \, X_{r;t} = X_{tun;t} \quad for\ t = 1990, \dots, 2010 \tag{2}$$

the synthetic control estimator, $Impact_t, for\ t = 2011, \dots, 2013$ is 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.[7] In simple words, 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 economic structure.

After finding the optimal weights that satisfy equations (1) and (2) the real GDP per capita for the synthetic Tunisia is estimated using

$$\widehat{GDP}_{Synth;t} = \sum_{r=1}^{R} w_r^* \, GDP_{r;t} \quad for\ t = 1990, \dots, 2013. \tag{3}$$

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

$$Impact_t = GDP_{tun;t} - \widehat{GDP}_{Synth;t} \; for\ t = 2011, \dots, 2013. \tag{4}$$

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 the 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

[7] To perform this minimization, we used the "synth" package developed by Abadie et al. (2010) for STATA 13.1.

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 leading to endogeneity due to a possible reverse causation (Billmeier & Nannicini, 2013). Fourth, and foremost, 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 changes rather than from the exogenous shock itself (George and Benet (2005) and Geddes (2003)).

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 the 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 trends or using forecasts produced by international institutions such as the IMF or the World Bank, counterfactuals constructed using the 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 outcome. However, unlike DiD, which only accounts for time-invariant effects, the SCM captures time-changing unobservable variables.

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) published by the World Bank from 1990 to 2010. Given that the Gross Domestic Product (GDP) per capita is recognized internationally to be the best reliable measure of the state of the economy, 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 paper as GDP per capita also downloaded from the WDI database.

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 neighboring 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

1.[8] 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 3.

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). We require Tunisia and its synthetic counterpart to have approximately the same structure in terms of the composition of expenditure[9] (consumption, investment (denoted as GCF), imports and exports) and value added[10] (value added of the agriculture, industry and services sectors) in the pre-treatment period. To account for possible differences in the human development level between Tunisia and its synthetic counterpart, we include in our set of covariates life expectancy at birth and the secondary school enrolment rate, which are both components of the widely used Human Development Index. Data for all the covariates were downloaded from the World Bank WDI database. Note that we divide our full sample for each covariate, except for the human development indicators (life expectancy at birth and secondary school enrollment)[11] into two sub-samples: 1990-2000 and 2001-2010. 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 select the set of donor countries according to, only, the characteristics' average between 1990 and 2010, then 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 the synthetic Tunisia with the 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. Table 2 provides a definition and the source of each variable used, while Table 3 displays the variables' average corresponding to each country in in the set of 114 donor controls.[12]

[8] All tables are available in the Appendix.

[9] According to the expenditure approach: $GDP = Consumption + Investment + Exports - Import$.

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

[11] 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. For that reason, we considered the average over the whole pre-revolution period (1990-2010).

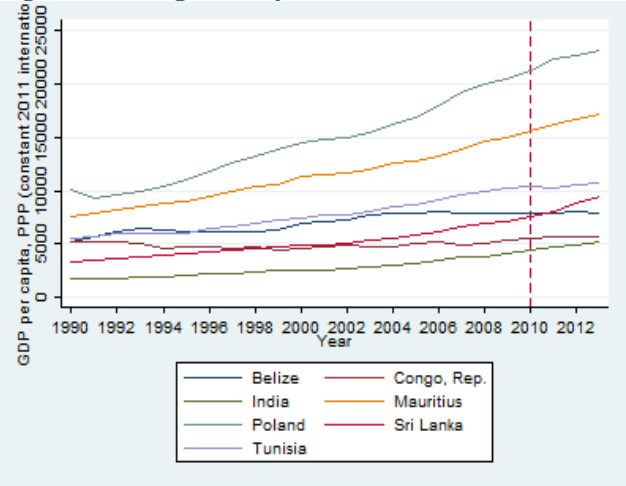
[12] Table 2 and Table 3 are presented in the Appendix.

5. Estimating the Economic Impact of the Arab Spring

5.1 Empirical Results

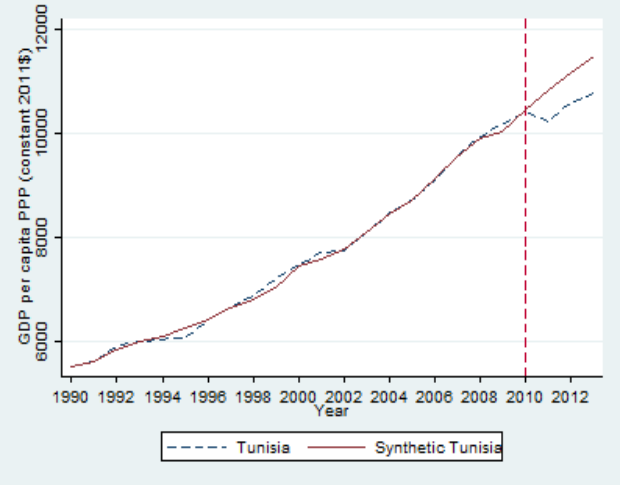
Table 4 shows that Synthetic Tunisia is best reconstructed as a weighted average of 14 countries, with Poland, Congo Republic, Sri Lanka, India, Mauritius and Belize having the highest weights. Figure 1 illustrates the GDP per capita of Tunisia and these six other countries over time.[13] Table 5 displays 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. 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 pre-2011 per capita GDP, the respective shares of investment (GCF), consumption, imports, exports, agriculture, service in total GDP and life expectancy at birth as well as the secondary school enrolment rate. In general, Table 5 suggests that Synthetic Tunisia, constructed using the SCM, has almost the same economic and social structure as the actual Tunisia during the pre-2011 period.

Figure 1: GDP per capita: Tunisia and countries with highest six weights in Synthetic Tunisia.



Source: WDI database.

Figure 2: GDP per capita: Tunisia vs Synthetic Tunisia



Source: Author's calculations.

Figure 2 depicts the paths of per capita GDP path of actual and Synthetic Tunisia, which are very similar up to 2010, but diverge markedly thereafter. In particular, each Tunisian citizen is estimated to have lost, on average, an estimated US$ 600 (5.5 percent of GDP), US$ 574 (5.1 percent of GDP) and US$ 735 (6.4 percent of GDP) in 2011, 2012 and 2013, respectively.

[13] From Figure 1 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 increased 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 upwards our results as it was not purely driven by structural economic activity, our results are not affected by excluding Sri Lanka from our sample (see the robustness analysis in section 6 below).

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 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 if 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 actual country and its synthetic counterpart. In essence, we want to examine whether our results were purely subject to chance and whether repeating the synthetic control analysis to countries that, in 2011, were not subject to the Arab Spring would have yielded similar results to ours. If this is the case, then the observed drop in Tunisia's per capita GDP would have been driven by factors other than the uprisings, hence invalidating our results.

More precisely, the estimated US$ 20.6 billion loss in the Tunisian economy during the period 2011-2013 would be unlikely to have been driven by factors other than the Jasmine revolution if the placebo tests applied in 2011 to every country in the set of 114 donor countries do not yield a negative impact larger than the Tunisian one. Figure 3 presents the results of the Placebo tests applied to the 114 countries in 2011. While the thick blue dotted line represents the previously estimated difference for Tunisia, the other different 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.

At a first glance, we see from Figure 3 that the blue dashed line was superimposed with other colored lines after 2010 implying that the negative impact generated by the Tunisian revolution was not unusually large. However, taking a closer look at these lines (representing placebo tests for the 114 control countries) we notice that they were already largely negative before 2010. Consequently, and in order to compare the impact of the Tunisian revolution relative to the other placebos, we look at a normalized ratio where we divide, for each placebo that exhibited a negative gap after 2010, the post-2010 gap by the pre-2010 gap.[14] The higher is this normalized ratio, the larger is the negative impact of a shock after 2010. Table 6 suggests that Tunisia had an estimated normalized ratio of 8.46 which is the second highest among all the 115 countries and 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 original results are unlikely to have been driven by factors other than the Jasmine revolution.

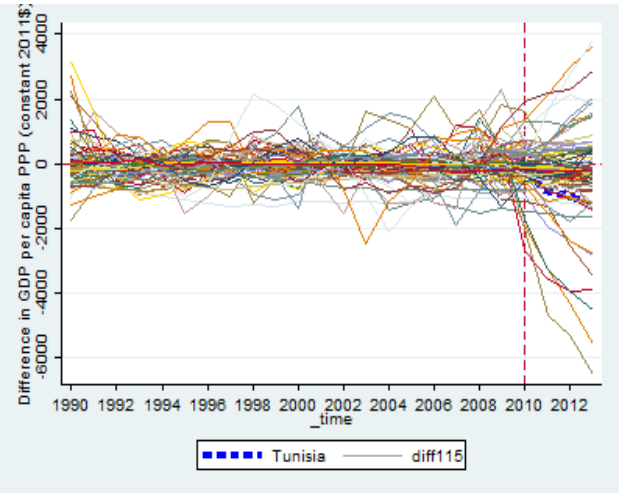
In addition, we use another simple, yet novel, method to test the significance of our results. In particular, we calculate

[14] The gap for country i during $s = 1, \dots, T$ is nothing else then the the Root Mean Squared Error (RMSE) calculated as $\sqrt{\frac{1}{T}\sum_{s=t}^{T}(y_s^i - y_s^{synth})^2}$.

$$y_t = \frac{Actual\ GDP\ per\ Capita_t}{Synthetic\ GDP\ per\ Capita_t} \quad for\ t = 1990, \ldots, 2013 \qquad (5)$$

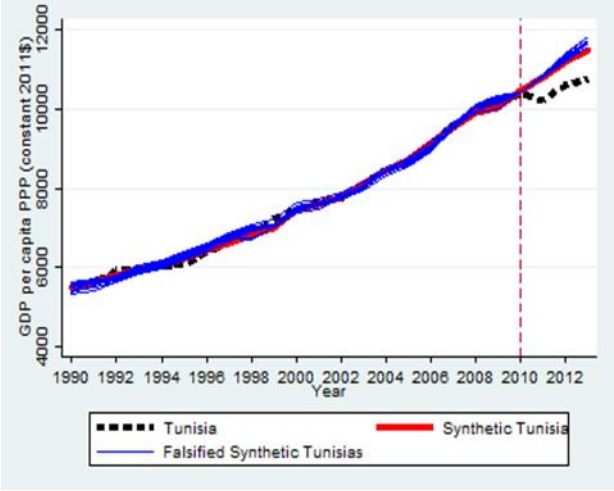
for Tunisia and each of the 114 control countries, and then regress this variable on a constant and a dummy variable called AS_t that takes 1 for 2011, 2012 and 2013 and 0 otherwise. In each of the 115 individual regressions, we are interested in the magnitude and sign of the t-statistic corresponding to the AS_t dummy. In particular, largely negative t-statistics suggest that events that occurred between 2011 and 2013 had significantly negative impacts on the respective economies. The results reported in Table 7 show that, with the exception of Spain, the Tunisian version of regression (5) yielded the largest negative t-statistic on the AS_t dummy (-8.7), confirming the salience of our results.

Figure 3: Placebo tests



Source: Author's calculations.

Figure 4: Distribution of Synthetic Tunisia after omitting one control country



Source: Author's calculations.

6. Robustness Checks

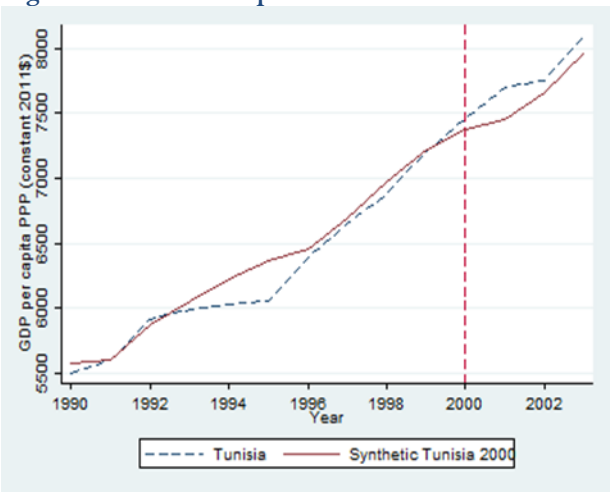
To assess the effectiveness of our results and make sure that the GDP per capita of the constructed Synthetic Tunisia is not driven by only one country, we perform a robustness check according to the following procedure. First, we restrict our sample to all the control countries that were assigned a non-zero weight in the baseline Synthetic Tunisia.[15] Second, we construct several synthetic Tunisias by omitting one of these countries 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 4 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.

[15] These countries are: Belarus, Vietnam, Moldova, Cuba, Peru, Lesotho, Korea Republic, Uzbekistan, Panama, Poland, Congo Republic, Sri Lanka, India, Belize and Mauritius.

Another falsification (or fake) test that can be used to determine the reliability of our results is the "time series placebos". In this test we replicate the synthetic control analysis for years earlier than 2011 in which the Tunisian economy did not actually experience any structural change (or shock) and ask the following question: Do we observe a significantly large 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 (illustrated in Figure 4) 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 economic slowdown during the period 2011-2013. Consequently, we replicate the same SCM procedure followed above by constructing the 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 subject to any structural shock in the early 2000s. As illustrated in Figure 5 we find that Tunisia's per capita GDP did not drop relative to its synthetic counterpart in the aftermath of 2000.

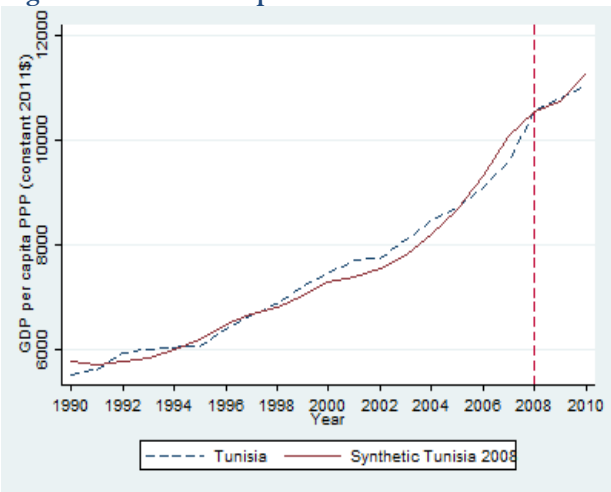
However, given the high dependence of Tunisia's economy on economic activity in the Euro area[16] one might argue that the sluggish economic activity in Tunisia after 2011 was driven by weaker demand from the Euro-area. In order to test for that, we replicate the SCM analysis to 2008 the year when the Euro area witnessed a sharp deceleration in its economic activity as a result of the 2007-08 financial crisis. We notice from Figure 6 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 cements 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.

Figure 5: Time series placebo test in 2000



Source: Author's calculations.

Figure 6: Time series placebo test in 2008



Source: Author's calculations.

[16] For example the correlation between the growth rate of Tunisian exports and economic growth in the Euro area was 0.64 between 1998 and 2012.

Finally, we use a different methodology to quantify order to quantify the impact of the Arab Spring (AS) on the Tunisian GDP. In particular, we estimate the following Autoregressive Distributed Lag (ADL (1)).

$$\Delta \log(\text{Tunisia}_t) = c + \beta_1 . \Delta \log(\text{World}_t) + \beta_2 . \Delta \log(\text{Tunisia}_{t-1}) + \beta_3 . \Delta \log(\text{World}_{t-1}) + \beta_4 . \text{AS}_t + \mu_t \qquad (6)$$

where $\Delta\log(\text{Tunisia}_t)$ is the log difference of Tunisia's GDP per capita and AS_t is a dummy variable, representing the Arab Spring, that takes the value of 1 from 2011 onward 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 log difference World GDP per capita. The per capita GDP data for both Tunisian and the World, which spans from 1990 to 2013,[17] was downloaded from the WDI database. In equation (6) the coefficient of interest is β_4 which captures the impact of the Arab Spring on Tunisia's per capita GDP growth. The results are reported in column 1 of Table 8. As expected, the coefficient β_4 is negative and statistically significant at the five percent level. In particular, growth of GDP per capita (in PPP terms) dropped, on average, by 2.8 percentage points as a result of the Arab Spring between 2011 and 2013.[18] This compares to a 2 percentage points drop in the growth rate averaged over 2011-13 when using the Synthetic Control Method.[19]

However, as illustrated in Figure 2, we see that the gap created in 2011 between Tunisia's GDP per capita and that of its synthetic counterpart as a result of the Arab Spring shrank in 2012 when the security conditions were improved compared to the previous year. This gap, however, widened again in 2013 following the renewed protests again the Muslim brotherhood government and the assassination of two prominent opposition figures. These observations suggest that growth rate (illustrated by the slope of GDP per capita in Figure 2) was severely hit by the Arab Spring only in 2011. To examine this hypothesis, we replace, in equation (5), the aggregate dummy AS_t by individual time dummies for 2011, 2012 and 2013 that take 1 for the corresponding year and 0 otherwise. The estimation results of that specification, presented in column 2 of Table 8, show that, of the year dummies, only that for 2011 is negative and statistically significant at the 1 percent level. In terms of magnitude, growth of GDP per capita (in PPP terms) dropped by 5.8

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

[18] Despite having only 22 observations, this model passes all the diagnostic checks we perform. In particular, the Shapiro–Wilk normality test, the Breusch-Godfrey test for serial correlation and the Breusch-Pagan test for homoscedasticity have p-values of 0.254, 0.318 and 0.346, respectively, meaning that the OLS assumptions are all satisfied.

[19] The 2 percentage point drop in GDP per capita growth rate was calculated from the SCM results as follows. First, we calculate the per capita GDP growth rate of the actual Tunisia and that of synthetic Tunisia based on the actual values presented in Figure 1. Second, we take the difference between these two numbers for each of 2011, 2012 and 2013. Third, and finally, we take the simple average between these differences.

percentage points. This compares to a 5.2 point drop in the growth rate in 2011 when using the Synthetic Control Method.[20]

While the coefficients on the 2012 and 2013 dummies are statistically insignificant, their magnitude shed some light on the responsiveness of the Tunisian economy to the political and security events as reflected in Figure 2. Particularly, the near zero coefficient on the 2012 dummy suggests that the Tunisian economy was recovering back to its pre-Arab Spring growth rate level, while the negative coefficient on the 2013 dummy indicates that the deteriorating security conditions during that year reversed the recovery path.

7. The Main Channel of the Impact

Given the substantial negative impact of the Arab Spring on Tunisia, the question arises as to what was the main channel through which the impact occurred?

7.1 Stylized Facts in the Wake of the Revolution

In order 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 2003 to 2013 published by the Central Bank of Tunisia. As illustrated in Table 9, 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, it dropped by 12.7 percent in 2011 when the Tunisian revolution erupted, grew by 4.7 percent in 2012 with the relatively improved security conditions and then decelerated with only 1.1 percent growth in 2013 as the political crisis between the secular opposition and the Islamic brotherhood intensified.

In addition, the revolution had an adverse effect on real exports[21] through lower mining and tourism inflows as illustrated in Figure 7. 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 poor citizens demanding jobs and higher living standards, paralyzed the phosphate industry in the city of Gafsa. Data published by the Tunisian National Institute of Statistics (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. 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

[20] The 5.2 percentage point estimates 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.

[21] For a decomposition of total exports please refer to Table 10 in the Appendix.

fell to under 3 million" (African Development Bank, 2012, p. 5). This has largely contributed[22] to the 4.3 percent contraction of total real exports in 2011. On the other hand, consumption growth did not witness a changing pattern after 2011.

7.2 Empirical Results

Given that the investment dropped the most in 2011, we argue that investment was the main channel through which the Arab Spring impacted the Tunisian economy. In order to investigate this hypothesis, we employ the SCM methodology used above by constructing a counterfactual for Gross Capital Formation (GCF or Investment) as percentage of GDP between 1996 and 2010.[23]

Our set of covariates include 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, several scholars have argued that investment is negatively associated with uncertainty as it 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 & Yook, 2012, p. 49).[24] Hence, to account for political uncertainty, we incorporate into our set of characteristics the Rule of Law Estimate taken from the Worldwide Governance Indicators database (WGI) published by the World Bank.[25]

As illustrated in Figure 8, before the Arab Spring started in 2011, the red line, representing the GCF of the constructed synthetic Tunisia followed very closely the blue dotted line corresponding to the GCF of actual Tunisia. However, since 2011 the two lines diverged significantly with the latter being much lower than the former, implying that investment in Tunisia was adversely impacted by the Arab Spring. More specifically, Tunisia's investment as a ratio of GDP was lower than that of its synthetic counterpart by an estimated 3.5, 2.6 and 3.6 percentage points in 2011, 2012 and 2013, respectively.

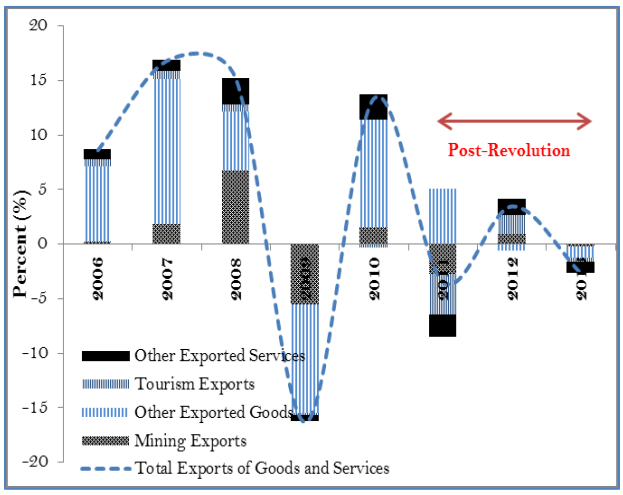
[22] $Contribution\ to\ total\ exports\ (t) = [growth\ rate\ (t) \times Share\ of\ total\ Exports\ (t-1)]/100.$

[23] 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.

[24] Bernanke (1983), Barro (1991), Alessina and Perotti (1996), Pynduck and Solimano (1993), Bloom et al. (2007), and Julio and Yook (2012) among others.

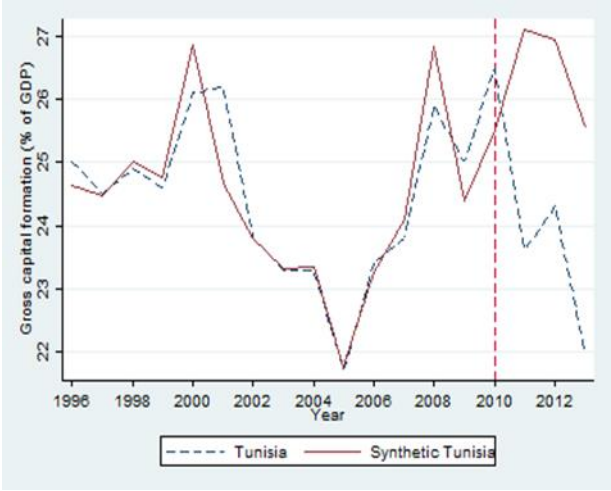
[25] The definitions for the rule of law estimate, FDI and broad money are all available in Table 2.

Figure 7: Contribution to growth of total exports



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

Figure 8: GCF (% of GDP): Tunisia vs Synthetic Tunisia



Source: Author's calculations.

8. Conclusion

Notwithstanding the worldwide interest in the Arab Spring in general and the Tunisia revolution in particular, there are no studies that have quantified the impact of this, largely unanticipated, event on the Tunisian economy. This paper fills this research gap by quantifying the effect of the Arab Spring on the Tunisian macro-economy from 2011 to 2013. To overcome the data limitation problems and to allow for time-changing unobservable variables, we use the synthetic control method by constructing a synthetic Tunisia defined as Tunisia in the absence of the Arab Spring.

Our results suggest that the Arab Spring had a negative effect on the aggregate economy with each Tunisian citizen loosing, on average, an estimated US$ 600 (5.5 percent of GDP), US$ 574 (5.1 percent of GDP) and US$ 735 (6.4 percent of GDP) in 2011, 2012 and 2013, respectively. The estimates, which are robust to placebo tests and different sensitivity analysis, suggest that the impact varied over time reflecting the intensity of the political instability in Tunisia. We also find investment was the main channel through which the economy was impacted, as investors were afraid to invest in a highly volatile political environment.

While this paper draws a broad picture of the impact of the Arab Spring on Tunisia's economy, it does not quantify the political benefits Tunisians gained from moving from an autocratic to a democratic regime. The post-shock period is too short to assess the long-run impact of Arab Spring on the Tunisian economy. However, our results suggest that the pace at which the Tunisian economy will catch up with its synthetic counterpart will depend 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. Further work still needs to be done to better understand the implications of the Arab Spring. For example, research from a micro

perspective is needed to understand how micro agents (firms and households) were impacted by the uprisings and whether the impact was heterogeneous across different groups.

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Appendix

Table 1: List of Omitted Countries

Country	Exogenous Schock 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 severly 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 bankrupcy
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	Impacted by the internal War since in 2014
Yemen Republic	Directly impacted by the Arab Spring since 2011
Vanuatu /16	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 china-yunnan
http://www.theguardian.com/world/2014/aug/03/earthquake-kills-southern-
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/WDSContentServer/WDSP/IB/2014/02/03/000442464_20140203124432/Rendered/PDF/843290WP0SVG0R0Box0382136B00PUBLIC0.pdf
/12 http://www.imf.org/external/pubs/ft/scr/2011/cr11344.pdf
/13 http://www.ccmf-uwi.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.worldbank.org/en/news/press-release/2015/03/30/world-bank-group-offers-support-to-aid-vanuatu-recovery

Table 2: 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	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
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

Table 3: 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 Enrollement (%)
Albania	17.1	27.8	110.9	95.9	41.0	48.8	13.0	25	3,387	4,304	5,979	8256.7	40.8	22.6	34.5	58.9	74.2	71.8
Angola	18.2	13.0	79.7	68.4	63.0	53.3	65.1	72	3,208	2,958	3,413	5806.2	12.4	8.7	29.9	27.7	45.4	17.9
Antigua and Barbuda	36.0	29.9	68.0	84.2	83.6	65.4	79.5	51	17,579	18,089	19,269	23355.1	3.8	1.9	77.5	79.5	73.3	104.4
Armenia	21.4	30.3	105.7	89.6	57.4	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	25.2	26.9	75.7	74.6	18.8	21.2	17.9	20	28,587	32,190	36,449	40451.9	3.6	3.1	67.7	69.9	79.4	142.9
Austria	26.3	24.0	74.2	72.9	36.3	45.0	35.8	48	31,929	35,241	39,321	42552.2	2.5	1.6	65.2	68.2	78.1	101.2
Azerbaijan	21.2	31.5	87.2	55.4	47.9	41.3	39.5	54	6,359	3,597	5,397	12952.6	25.7	10.0	37.8	30.0	67.0	89.0
Belarus	28.4	31.1	75.8	75.0	60.9	66.9	56.8	61	7,155	6,063	8,355	13450.7	17.6	10.4	41.0	48.1	69.2	96.6
Belgium	22.7	23.1	74.5	73.4	58.7	69.8	61.5	73	31,378	34,314	38,126	40791.3	1.4	1.0	70.0	73.8	78.0	125.8
Belize	24.4	20.6	81.0	86.6	57.6	62.9	52.2	56	5,944	6,170	7,379	7906.0	17.6	14.6	61.5	65.5	71.2	73.8
Benin	17.2	20.2	89.9	88.6	32.2	28.3	25.2	20	1,368	1,446	1,573	1619.4	34.7	34.7	52.5	51.2	55.8	25.8
Bhutan	40.4	52.0	72.7	65.1	45.3	56.4	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	15.0	90.3	82.1	27.9	31.0	20.6	34	3,848	4,293	4,457	5061.8	16.2	14.2	51.9	52.4	62.8	79.0
Botswana	29.4	31.7	62.4	62.5	43.9	42.0	52.1	48	8,379	9,531	10,712	12651.3	4.2	2.7	44.3	53.9	52.4	66.5
Brunei Darussalam	27.5	14.6	63.4	46.2	49.3	32.5	58.4	72	77,353	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	85.0	43.4	56.3	44.5	44	8,458	8,650	10,264	14160.2	14.9	8.2	52.7	63.1	71.9	92.4
Burkina Faso	22.3	21.8	91.4	92.2	24.6	25.2	11.0	11	849	969	1,110	1321.8	32.8	25.1	45.5	52.2	51.2	12.5
Burundi	8.6	17.5	105.4	106.7	22.8	31.3	8.8	7	1,015	761	705	697.5	50.9	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	2,425	2,283	2,478	2559.3	24.1	22.1	45.2	46.9	52.7	28.2
Chad	14.0	32.9	100.0	83.6	30.1	52.2	16.1	36	1,112	1,049	1,198	1781.3	37.2	46.3	49.3	37.1	47.2	13.5
Chile	25.0	22.0	74.3	72.0	28.4	31.6	29.1	38	10,652	14,068	15,542	18385.5	7.9	4.4	54.5	58.1	76.5	86.9
Colombia	19.5	20.5	82.1	82.2	18.4	19.1	16.8	16	7,780	8,437	8,528	10229.7	14.5	8.2	53.1	59.0	70.9	74.7
Comoros	17.4	13.2	104.9	109.8	39.5	38.7	17.2	16	1,506	1,381	1,435	1424.0	40.9	41.1	47.6	47.0	57.9	35.2
Congo, Dem. Rep.	7.7	11.9	91.3	92.7	21.0	31.0	22.0	27	977	647	506	565.4	45.5	25.3	33.4	41.8	47.2	32.3
Congo, Rep.	28.2	22.3	58.6	53.9	48.0	56.0	61.2	80	5,090	4,645	4,744	5193.9	10.0	4.9	42.1	25.1	53.9	46.1
Costa Rica	18.6	22.7	84.2	81.5	42.4	49.1	39.6	45	7,753	8,779	9,827	12019.6	12.5	8.3	57.0	63.0	77.6	65.7
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	53.2	48.7	24.3
Czech Republic	29.2	29.7	71.3	69.0	40.8	56.8	40.3	58	18,062	19,742	22,368	27703.5	4.0	2.4	57.3	60.4	74.7	91.9
Denmark	20.4	22.0	74.0	72.8	32.3	42.6	37.9	48	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	59.8	54.0	42.5	41	2,718	2,170	2,124	2452.7	3.4	3.6	80.1	80.1	57.6	16.6
Dominican Republic	20.1	21.6	85.7	85.3	42.3	37.5	36.5	31	5,670	6,989	8,203	10188.1	10.4	7.0	55.4	62.9	70.6	63.9
Ecuador	21.3	23.3	79.0	78.6	23.3	28.8	22.9	27	7,594	7,740	7,757	9024.4	20.7	10.8	51.3	55.2	72.9	61.3
El Salvador	17.0	15.7	96.8	102.3	35.4	44.0	21.5	26	4,951	6,002	6,622	7395.5	14.3	10.8	56.2	59.7	69.5	55.4
Ethiopia	19.6	30.4	87.7	87.1	15.8	30.4	8.5	13	575	604	640	894.1	55.8	44.8	34.1	42.9	53.1	16.2
Fiji	18.0	21.1	83.5	90.8	60.7	66.3	59.1	55	5,744	6,233	6,743	7128.0	19.3	13.8	56.4	65.6	67.5	83.5
Finland	22.3	23.3	72.6	71.7	27.7	35.2	32.9	40	26,560	29,913	35,984	40139.0	4.4	2.7	62.5	63.9	77.6	116.8
France	21.2	22.3	77.5	78.0	21.9	26.7	23.2	26	29,837	32,038	35,352	36914.7	2.7	1.9	72.6	76.7	79.1	108.6
Gabon	25.6	24.3	55.0	47.5	36.0	28.2	55.4	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	50.5	50.3	29.2	31	4,465	2,825	3,765	5512.1	39.0	14.9	37.6	61.1	71.6	82.7
Germany	23.9	19.9	75.8	75.4	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	2813.5	42.3	35.5	32.8	40.5	58.0	45.0
Grenada	35.6	32.2	82.8	93.3	64.0	53.3	45.7	28	7,477	8,309	9,994	11646.7	9.8	5.3	69.9	74.5	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	52.1	19.8
Guinea-Bissau	24.0	5.6	99.3	105.1	37.3	29.9	14.0	19	1,531	1,519	1,258	1286.6	55.1	44.1	32.2	41.2	51.4	28.3
Guyana	33.5	24.2	81.0	94.2	115.4	108.3	101.0	92	3,763	4,957	5,221	5383.8	36.9	26.5	31.4	43.6	63.7	92.5
Hong Kong SAR, China	29.3	22.5	68.0	68.6	131.3	177.0	133.9	186	29,676	32,307	35,220	45085.8	0.1	0.1	87.5	91.2	80.5	80.5
Iceland	21.0	23.9	79.3	78.9	33.4	40.6	33.0	38	27,752	30,128	34,935	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	53.3	62.1	51.5
Indonesia	27.1	26.1	69.6	69.3	27.7	26.1	31.1	31	5,059	6,051	6,149	7631.7	17.7	14.4	40.2	39.7	67.1	57.7
Ireland	20.5	24.6	69.8	62.2	62.4	71.3	72.1	84	23,529	32,562	43,902	47103.1	4.4	1.6	62.0	65.8	77.2	109.7
Italy	20.1	21.1	77.6	79.1	19.7	25.2	21.9	25	31,269	33,735	36,615	36917.4	3.2	2.3	68.0	71.8	79.5	92.4
Kazakhstan	21.4	28.9	81.1	63.1	45.6	41.0	43.1	49	10,611	8,430	12,084	18012.0	14.0	7.0	51.0	52.8	66.3	97.0
Kenya	18.2	18.4	86.0	90.7	31.4	32.6	27.1	24	2,259	2,205	2,166	2399.9	30.9	27.0	51.4	53.4	55.8	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	5.9	3.1	56.2	59.8	75.9	97.6
Kyrgyz Republic	18.1	21.3	94.3	98.7	47.5	65.0	35.1	45	2,677	1,873	2,211	2634.2	40.3	30.9	31.9	45.2	67.8	88.4
Lao PDR	13.9	24.5	100.2	85.1	36.7	42.1	23.6	33	1,704	2,081	2,563	3451.3	55.5	37.7	25.6	37.9	61.2	33.9
Lesotho	61.8	27.7	144.3	143.8	131.7	125.2	25.6	54	1,379	1,537	1,703	1999.0	18.0	9.0	42.0	57.2	50.4	34.9

Source: World Development Indicators and Author's own calculations.

Table 3 (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 Enrollement (%)
Luxembourg	20.8	19.3	57.2	51.7	91.1	136.2	113.1	165.3	61,368	68,825	83,592	91,905	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	41,859	46,671	79,040	0.0	0.0	83.8	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	8,668	10,578	12.9	12.0	53.4	64.1	73.1	79.8
Madagascar	12.6	24.4	95.5	92.2	29.2	43.0	21.1	26.3	1,509	1,402	1,381	1,438	28.6	28.1	59.0	56.2	57.8	24.9
Malawi	17.3	21.9	96.5	95.3	39.0	43.0	25.2	25.8	551	635	608	674	37.5	33.2	40.3	49.0	48.0	26.8
Malaysia	35.5	22.6	58.9	57.6	88.1	85.9	93.8	105.7	11,580	14,762	16,206	19,335	12.7	9.2	44.2	45.7	72.8	62.9
Malta	25.5	16.7	83.8	84.2	90.6	83.7	81.4	82.8	18,101	22,423	25,108	26,860	2.9	2.5	46.8	59.0	78.1	85.2
Mauritania	21.0	32.4	82.7	89.1	41.4	58.0	37.8	36.5	2,761	2,802	2,715	3,283	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	9,861	11,865	14,178	9.9	5.3	58.1	66.5	71.3	79.5
Mexico	20.9	22.4	79.7	79.1	21.5	28.0	20.9	26.5	13,062	13,604	14,619	15,434	5.1	3.5	62.9	61.7	74.1	68.5
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	85.7
Mongolia	26.8	34.6	84.0	74.0	55.0	62.9	44.2	54.3	4,369	4,434	5,050	7,038	29.2	20.8	39.2	45.6	63.3	76.1
Mozambique	21.6	18.9	101.7	92.9	36.4	41.8	13.1	30.0	463	526	661	841	33.7	27.7	48.5	48.5	46.8	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	58.8	58.7	66.4	33,377	37,586	41,980	45,582	3.4	2.0	69.8	74.4	78.4	124.2
New Zealand	21.5	23.2	76.4	75.7	27.9	29.5	30.1	30.7	23,571	26,212	29,571	32,113	7.1	6.3	65.7	68.7	78.3	111.7
Nicaragua	22.8	25.3	98.9	96.0	40.6	47.6	18.9	26.3	2,908	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	91.8	23.1	32.6	16.6	17.6	843	802	778	795	39.2	37.1	43.4	47.5	50.6	8.5
Nigeria	10.1	9.3	78.2	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	31.8
Norway	23.6	23.3	69.0	62.6	31.6	28.1	39.0	42.2	45,814	54,528	60,238	64,240	2.8	1.6	63.3	57.8	78.8	113.5
Oman	16.1	26.0	73.4	53.7	35.8	33.6	46.3	53.9	36,513	40,844	43,646	44,975	2.5	1.7	48.8	38.0	72.1	72.9
Pakistan	18.6	17.7	84.8	86.5	19.5	18.5	16.1	14.4	3,199	3,405	3,595	4,237	26.1	23.2	49.6	53.7	63.8	28.1
Panama	24.6	20.5	72.3	73.2	85.4	66.1	88.4	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	1,788	1,960	32.7	38.6	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	76.8	17.3	21.0	14.0	24.2	5,367	6,359	6,756	8,741	9.3	7.8	59.3	55.8	70.1	79.7
Poland	20.5	21.0	80.5	81.6	24.6	37.8	23.6	35.2	9,851	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	28.4	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	68.0	62.1	61.5	69.8	79.8	26,294	30,243	35,624	36,106	1.4	0.6	13.3	10.3	76.3	84.1
Romania	24.3	25.3	81.9	83.8	31.5	42.1	25.3	33.0	9,992	10,284	11,495	16,249	19.3	10.0	39.4	52.9	70.9	83.4
Rwanda	14.0	17.9	105.9	96.4	26.0	25.4	6.1	11.2	813	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	41,831	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	1,806	1,810	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	98.7	21.6	88.1	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	28.7	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	1,566	1,727	41.5	33.8	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	9,847	9,829	10,245	11,839	4.1	3.1	61.2	66.2	56.8	86.6
Spain	23.8	28.0	78.0	75.5	23.4	28.9	21.6	25.4	24,631	27,335	31,808	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	5,182	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	9,768	10,573	13,445	12.7	8.1	62.9	50.4	68.4	67.8
Sweden	22.1	22.6	73.4	70.9	30.9	38.8	35.4	45.3	30,016	32,757	38,193	42,533	2.6	1.6	67.2	69.0	79.6	120.5
Switzerland	26.7	24.2	69.4	67.4	39.8	47.3	43.7	55.7	45,343	45,942	49,292	53,453	1.6	0.9	69.3	72.3	79.8	96.5
Tajikistan	24.5	16.7	81.2	111.6	58.9	65.6	53.2	37.2	2,519	1,110	1,407	1,932	30.9	23.6	32.5	43.5	64.2	83.3
Tanzania	21.4	24.1	96.5	83.3	33.5	25.5	15.7	18.1	1,417	1,408	1,612	1,993	43.5	32.4	39.8	45.8	52.0	8.6
Togo	16.2	16.3	93.7	100.2	40.5	54.5	30.6	38.1	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	4,848	29.2	20.3	52.9	59.8	70.8	104.7
Trinidad and Tobago	20.6	20.6	71.5	56.8	40.7	38.7	48.6	60.5	13,469	15,268	20,512	28,981	2.3	0.8	52.1	42.4	68.7	81.7
Turkey	23.2	18.9	79.7	83.4	21.5	25.7	18.5	23.5	10,918	12,399	13,008	16,041	15.2	10.0	52.3	62.1	69.7	73.5
Uganda	16.4	22.3	95.3	89.3	21.6	27.1	9.9	15.5	807	996	1,135	1,423	46.2	25.6	38.1	50.4	49.8	17.0
United Kingdom	19.4	18.1	81.1	84.5	25.5	28.8	25.0	26.3	26,576	29,813	34,188	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	46,838	49,948	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	18.9	27.0	10,722	12,653	12,043	14,847	8.0	10.0	62.8	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	30.8	15,361	15,092	13,561	16,659	5.1	4.6	45.0	43.4	72.6	68.1
Vietnam	23.9	34.2	83.2	74.1	45.8	69.9	38.7	61.6	1,679	2,306	2,942	3,985	29.6	19.9	41.1	42.8	73.3	45.8
Zambia	13.8	29.9	91.6	64.0	36.5	32.9	30.5	30.3	2,199	2,062	2,227	2,849	19.4	14.9	41.3	54.3	44.8	20.8
Zimbabwe	18.9	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	48.9	41.9
Tunisia	26.0	24.3	78.1	78.5	45.1	48.8	41.0	45.9	5,810	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	12068.3	13093.5	14585.3	16741.5	18.9	14.7	51.3	55.0	66.1	67.2

Source: World Development Indicators and Author's own calculations.

Table 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 5: 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 average 1990-1994 (US$)	5,810	5,801	12,068
GDP average 1995-1999 (US$)	6,636	6,627	13,093
GDP average 2000-2004 (US$)	7,895	7,877	14,585
GDP average 2005-2010 (US$)	9,656	9,634	16,742

Source: Author's own calculations.

* All variables are in percentage of GDP (%) unless stated otherwise.

Table 6: 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 syntehtic 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 7: 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 8: ADRL(1) Results

	(1)	(2)
D.log($World_t$)	0.226	0.258
	(0.293)	(0.266)
D.log($Tunisia_{t-1}$)	-0.192	-0.084
	(0.242)	(0.260)
D.log($World_{t-1}$)	0.249	0.297
	(0.301)	(0.288)
AS	-0.028**	
	(0.013)	
AS(2011)		-0.058***
		(0.018)
AS(2012)		-0.003
		(0.022)
AS(2013)		-0.018
		(0.017)
Constant	0.029***	0.024**
	(0.010)	(0.010)
Observations	22	22
R-squared	0.249	0.455

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Note: AS is a dummy variable representing the Arab Spring that takes 1 from 2011 onward and 0 otherwise. 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.

Table 9: Decomposition of GDP Growth Rate 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	4.2	3.1
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	5.1
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	2.6
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	4.7	1.1

Source: National Institute of Statistics.

Table 10: Share 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: National Institute of Statistics and author's own calculations.