ECONOMIC RESEARCH FORUM

منتدى البحوث الاقتصادية

2013

working paper series

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Working Paper No. 767

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Working Paper 767

September 2013

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First published in 2013 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Abstract

This paper diagnoses the constraints to growth in Egypt at the sectoral level using the 2011 Egyptian revolution as a natural experiment. Combining a quantile regression and a difference in difference methodology, we present empirical evidence in support of our hypotheses that the revolution has had an adverse impact on the Egyptian economy, on average, but with heterogeneous effects across different sectors. We identify the sectors most impacted and their characteristics. Results reveal that Egypt's fastest growing sectors before the revolution seem to have been the most vulnerable after the revolution. This evidence is supported by our growth diagnosis approach that illustrates that faster growing sectors are constrained by continuous increases in overall prices that appreciate the real exchange rate and threaten export competitiveness (as they erode the benefits accrued to nominal depreciation of currency), but benefit from higher monetary growth and less constraints on credit availability. Despite accommodating monetary policy to ease liquidity constraints and mobilize private sector growth, lingering uncertainty post-revolution has shattered business confidence and hampered recovery efforts. The fastest growing sectors of the economy have been most affected by these constraints. In contrast, the slower growing sectors of the economy mainly suffer from credit constraints, mostly reflecting structural impediments that existed long before the revolution. Our results, which hold under a number of robustness checks, are rather informative to policy makers regarding priorities for the macro economy to revive confidence, contain inflationary pressures, boost competitiveness, and design industrial policy to ease structural impediments and align sectoral growth with macro priorities.

JEL Classification Codes: O2, N15, C21

Keywords: Egyptian revolution, Arab spring, natural experiment, quantile treatment effects

ملخص

تقوم هذه الورقة بتشخيص القيود التي تعوق النمو في مصر على المستوى القطاعي باستخدام الثورة المصرية في 2011 كتجربة طبيعية. وبالجمع بين الانحدار الكمى والفرق فى اختلاف في المنهجية ، تقدم هذه الورقة الأدلة التجريبية في دعم الفرضيات التى لدينا بأن الثورة كان لها تأثير سلبي على الاقتصاد المصري، في المتوسط، ولكن مع تأثيرات غير متجانسة عبر مختلف القطاعات. نقوم بتحديد القطاعات الأكثر تأثرا وخصائصها. وبينت النتائج أن القطاعات الأسرع نموا في مصر قبل الثورة، على ما يبدو اصبحت الأكثر ضعفا بعد الثورة. يتم اعتماد هذا الدليل من قبل نهجنا فى تشخيص النمو الذي يوضح أن أسرع القطاعات نموا مقيدة من قبل الزيادات المستمرة في الأسعار عموما والتى تقدر سعر الصرف الحقيقي وتهدد القدرة التنافسية للصادرات (لأنها تؤدي إلى تآكل الفوائد التي تعود على الاستهلاك من العملة)، ولكنها تستفيد من النمو النقدي وتواجد قيود أقل على توافر الائتمان. على الرغم من استيعاب السياسة النقدية لتخفيف القيود على السيولة وحشد نمو القطاع الخاص، الا ان عدم اليقين بعد الثورة أدى إلى تحطم الثقة في الأعمال التجارية وإعاقة جهود الإنعاش. وكانت القطاعات الأسرع نموا من الاقتصاد هى الأكثر تضررا من هذه القيود. وفي المقابل، فإن أبطأ القطاعات نموا في الاقتصاد والتى تعاني أساسا من قيود الائتمان، تعكس في معظمها العوائق الهيكلية التي كانت موجودة قبل فترة طويلة من الثورة. نتائجنا، (التي ظهرت في إطار اجراء عدد من ضوابط المتانة)، هي بالأحرى مفيدة لصانعي السياسات فيما يتعلق بالأولويات للاقتصاد الكلي لإحياء الثقة، واحتواء الضغوط التضخمية، وتعزيز القدرة التنافسية، والسياسة الصناعية وتصميم لتخفيف العوائق الهيكلية ومواءمة النمو القطاعية مع أولويات الاقتصاد الكلى .

1. Introduction

The Egyptian revolution on January 25, 2011 was a transformative event, both at the political and economic domains, resulting in long lasting and wide implications throughout the Arab and the developing worlds. Unfortunately, however, the economy has not yet reaped the benefits of the revolution and instead has fallen into a vicious circle of economic and political instability. Thus far, economic conditions have significantly deteriorated and should be the top priority of the first elected government to avert the risk of further political instability. Thus, it is important that Egypt's growth be restored and be an inclusive process, so that the resulting prosperity improves not only the lives of Egypt's masses, but becomes a source of inspiration for the region's economies.

To that end, we must learn and diagnose what has and has not worked in order to move the Egyptian economy forward, to press ahead with recovery plans and to unlock the potential that is yet to be tapped. Our hypotheses for empirical investigation are as follows: (1) many sectors of the economy were adversely affected by the revolution, but (2) different sectors were affected differently by the revolution, and this difference warrants analysis and implications. The objective of this paper is to test such hypotheses, and more importantly to examine factors that underlie sectoral potential and others that present binding constraints towards explaining heterogeneous economic effects across sectors. Specifically, we examine if and how a number of factors, such as credit constraints, exchange rate fluctuations, cost of borrowing and inflation, among others, may have hampered economic activity of different sectors.

Although events that have occurred in the countries characterized by the "Arab Spring", and especially those that have occurred in Egypt, have had a clear impact on international political and economic debates, there exists no solid study that quantifies the effects and causes of such revolutions on the economies of the region. Sorenson (2011) argues that high levels of corruption, political stagnation, and a loss of faith in the electoral system ultimately accelerated the political unrests in the region. Diwan (2012a) offers a game theoretic framework for understanding the political and social reasons leading to the uprisings. Diwan (2012b) argues that the dynamic interaction between the changing interests of the middle class, the rise of "political Islam" and "crony capitalism" have collectively led to the ongoing transitions. Campante and Chor (2012) attribute the uprisings to the mismatch between education and economic opportunity. Galal and Selim (2012), in an extensive review of Arab development experiences since World War II, argue that the extractive nature of political and economic institutions is the primary cause of underdevelopment in the region. However, the authors see the silver lining of the recent awakening in the region, hoping that it would serve as a turning point towards more inclusive institutions that address persistent structural deficiencies. Although these studies may offer an institutional understanding of the underlying forces of the revolts, they do not directly address the economic effects on countries of the region. In this paper, we aim to offer the first such study using the Egyptian 2011 revolution as a case study.

We use quarterly data (output and investments) from 2002Q3-2012Q2 for twenty sectors, as well as other explanatory variables, to assess the effects of the revolution on the growth rates of different sectors across the largest economy of the Arab Spring group, i.e., in Egypt. We empirically test the above hypotheses in a number of steps. First, we simply run pooled OLS regressions with a dummy variable taking the value of one after the revolution (2011Q1 and onwards) and zero otherwise. Using a number of robustness checks, we conclude that the coefficient of interest is negative and statistically significant indicating that the revolution, on average, has had an adverse impact on the growth performance of different sectors in Egypt. The data requirements here are crucial, in terms of frequency and disaggregation, in order to ensure credible implications. By pooling quarterly data (as opposed to a panel), the regression results measure heterogeneities and identify necessary sectoral dummies.

Secondly, we examine the effect of the Egyptian Revolution on specific sectors by adding interactive dummies for every sector, multiplied by the time-series revolution dummy. This allows a more detailed examination of the impact of the revolution, in terms of the time-series structural break and across sectors of the economy. Employing various specifications, we conclude that the adverse effects are indeed heterogeneous across the Egyptian economy. Specifically, the time-series structural break dummy is negative and significant in some sectors, and insignificant, or even positive, in other sectors of the economy. We then identify treatment and control groups (sectors) from this step for further analysis. Specifically, treatment sectors are those which reported a negative and statistically significant time-series revolution dummy, while control sectors are those with positive or insignificant coefficients on the interactive revolution dummies.

In a third step, we use a "quantile treatment effects methodology" to provide even further evidence regarding the differential impact of the revolution across different sectors of the Egyptian economy. Quantile regressions allow an investigation of distributional and tail effects, not captured by examining simple averages in the normal regressions of step two. Having identified treatment and control groups (sectors) from step two above, the difference in sector performance due to the revolution is then analyzed, capitalizing on treatment and time dummies.

The results reveal that sectors at the top of the distribution of the outcome variable (i.e, sectors of the highest growth rates prior to the revolution) are the ones that have been most adversely affected by the revolution. In other words, the drivers of high growth rates in these sectors have been the most vulnerable, while sectors with relatively lower growth rates than average have proven to be more resilient to deteriorating economic conditions post- revolution. We note that the evidence does not suggest that the resilience of the latter group has necessarily benefited from deterioration across the former group, ruling out a "regression towards the mean" phenomenon. Specifically, there is no evidence that the low growth sectors have benefited from the revolution, as high growth sectors are adversely affected. In the fourth and final step, we perform a growth diagnostic approach with the aim of identifying which variables have led to the differential impact of the revolution across various sectors of the Egyptian economy. Two papers, by Haussmann (2008) and Rodrik (2010), on growth diagnostics inspired several country studies, including for Egypt (Enders, 2007). While novel, this approach is hard to implement, due to country heterogeneities among the cohort countries used to compare with the country in question and to decide which variable is a binding constraint in that specific country.

Fortunately, the revolution of 2011 in Egypt provides a natural experiment, alleviating the need to design comparison of critical variables across what is otherwise a heterogeneous group of countries1. We focus on the outliers across sectors of the Egyptian economy, i.e., sectors at the bottom of the growth distribution versus sectors at the top of the distribution, consistent with Easterly's (2005) view that outliers drive the results. Changes in the outlier sectors are indicative of changes in their environment to reveal the critical role played by each one of the binding constraints. We establish the link between the performance of outlier sectors and each of the explanatory determinants of growth, identified in earlier steps. To put it simply, we identify the binding constraints hampering the Egyptian economy in this growth-diagnostics framework, by using the January 2011 revolution as a natural benchmark across sectors.

[1] The problem of heterogeneity is of course not entirely alleviated. While the event is unique across statistical cells, the heterogeneity across sectors still remains.

In sum, the goal of this paper is to diagnose the constraints to growth in Egypt at the sectoral level, using the 2011 Egyptian revolution as a natural experiment. The results will inform policy makers of the binding constraints which should be addressed to mobilize sectoral growth and revive economic recovery. The results will anchor the strategy for macroeconomic policy priorities as they pertain to exchange rate management, credit and financial constraints and managing inflationary pressures, etc. In addition, the strategy for industrial policies regarding developments and investment priorities will benefit from the sectoral analysis of the variation in performance with respect to macro policies and structural constraints.

The paper is structured as follows. Section 2 discusses the average impact of the revolution using aggregate and sectoral time-series data for the Egyptian economy. Section 3 examines the differential impact of structural break attributed to the revolution across different sectors of the economy. Section 4 performs the growth diagnosis approach and finally Section 5 concludes.

2. Impact of the Revolution on the Egyptian Economy: The Average Effect

In this section, we first provide a descriptive analysis of the performance of different sectors before and after the revolution. We then perform a simple pooled OLS regression to study the average impact of the revolution on the growth rates of the Egyptian economy at an aggregate level.

2.1 An initial look at the data

We start with some summary statistics of the variables of interest. We look into simple averages before and after the revolution. The Egyptian economy achieved high growth rates in the years before the revolution. Even during the global financial crisis, thanks to fiscal stimulus packages, the Egyptian economy weathered the shocks relatively well with growth rates at 4.7 and 5.1 percent in FY 08/09 and 09/10, respectively. In the first half of FY 10/11, recovery was well underway with the growth rate reaching 5.2 percent, on annual basis through December 2010. Subsequently, a sharp contraction of 4.2 percent in the first quarter of 2011, followed by virtually zero growth in the last quarter of the fiscal year (through June 2011), resulted in an overall growth of only 1.8 percent in FY 10/11. Subsequent failure to mobilize recovery efforts limited growth in FY 11/12 to 1.8 percent, again (see Table 1).

A more detailed examination of the growth rates of output, classified by sectors, is provided in Table 2 below.

Sectors 1 (Agriculture), 2 (Mining-Crude Oil), 7 (Electricity), 10 (Transportation) and 17 (Real Estate Activities) are the only sectors out of the twenty sectors to experience higher growth rates after the revolution, following the sharp contraction in the first quarter of 2011. These sectors are involved either in natural resources or in traditional activities that are less vulnerable to cyclicality in consumption. The remaining sectors witnessed slower growth rates, based on comparison of the growth figures before and after the revolution. The evidence attests to pervasive deterioration in economic performance for many sectors of the Egyptian economy post-revolution.

2.2 Pooled ordinary least squares

As mentioned earlier, our analysis covers the period of the last ten years, using quarterly data to increase frequency and observations for econometric analysis. Specifically, our dataset covers quarterly data of real output growth in Egypt between 2002Q3-2012Q2. All variables are expressed in logs so as to scale down fluctuations and allow the interpretation of coefficients as elasticities.

Table 3 presents the time-series properties of the variables. We use the Augmented Dickey Fuller (ADF) and Elliott, Rothenberg and Stock (ERS) unit root tests to establish the stationarity of the variables in the empirical analysis. All variables have been seasonally adjusted, and transformed to first-difference to ensure stationarity.[2]

Our objective in this section is to assess the effect of the revolution on the Egyptian economy at an aggregate level. For this purpose, we estimate the following equation:

$$dy_{it} = \beta_0 + \beta_1\, dinv_{it} + \beta_2\, dreer_{it} + \beta_3\, dm1_{it} + \beta_4\, dcpi_{it} + \beta_5\, revdummy$$

where, the dependent variable is the sectoral growth rate of output for each of the twenty sectors, based on quarterly data. Explanatory variables include the growth rates of investments (dinv) at the sectoral level, the percent change of the real effective exchange rate (dreer) where an increase denotes depreciation, the growth of the money supply (dm1) and consumer price inflation (i.e., the change in consumer price index) (dcpi). We experiment with different variables as detailed below to check the robustness of our results. The revolution dummy (revdummy) is a dummy variable that takes a value of one since 2011Q1 till the end of our sample period as allowed by data availability, 2012Q2, and zero otherwise.

It would be expected that higher investment growth helps increase sectoral growth. Appreciation of the real effective exchange rate erodes competitiveness, particularly for export-oriented sectors. However, where the import content of intermediate inputs is high, appreciation of the exchange rate could help reduce the cost of production, with a positive effect on sectoral growth. The growth of the money supply would help ease liquidity constraints with a positive effect on access to credit and sectoral growth. Higher consumer price inflation is likely to increase the cost of labor and intermediate inputs with a negative impact on sectoral growth.

We are primarily interested in the sign and significance of the coefficient on the revolution dummy. Results from Table (4) indicate that it is negative and statistically significant, indicating that the revolution has had a negative impact on the growth rates of output for all sectors having controlled for other factors that may influence growth rates.

We also perform a number of robustness checks. These include replacing the consumer price inflation with producer price inflation (*dppi)*, replacing the growth rate of M1 with that of M2 (*dm2)*, replacing depreciation of the real effective exchange rate with that of the nominal effective exchange rate or the bilateral nominal exchange rate relative to the US dollar (*dneer* or *dexr)*, as well as adding inflation of global commodity prices (*dgcomm*) to measure the effect of imported inflation and the growth of foreign reserves (*dfreserve*) to measure its effect on business confidence and on sectoral growth.3 Across the various model specifications, the qualitative results and the significant structural break, post–revolution, are mostly robust.[4]

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[2] It has been argued in the literature that one should use the test proposed by Elliott, Rothenberg and Stock (1996) for maximum power against very persistent alternatives, i.e.: series that are very close to being non-stationary. The rejection of the null hypothesis in the case of the ADF test of the nominal effective exchange rate (*neer*) and the nominal exchange rate (*exr*), illustrates the relevance of using the ERS test in our context.

[3] It is worth noting that adding sector dummies to the pooled OLS regressions as in columns 2 and 4 of Table (4) incorporates individual sector heterogeneity and is equivalent to estimating the model as a panel fixed effects model.

[4] Results are not reported for space considerations but are available from the authors upon request. The reported results are based on the above specification, which has several advantages. First, CPI inflation is the most tracked measure of inflation in Egypt, which has direct impact on the cost of business. Secondly, monetary growth, based on M1, is more easily controlled by the policymakers, as it accounts for currency in

3. Impact of the Revolution: A Sectoral Approach

The results from the previous section suggest that the revolution has had, on average, a negative impact on sectoral output growth across many sectors in Egypt. In this section, we take the analysis a step further. Our hypothesis is that the adverse impact of the revolution has not been uniform across sectors of the economy. We aim at examining the specific sectors which have been adversely affected by the revolution. The analysis comprises two steps, as outlined below.

3.1 Pooled OLS: adding sectoral dummies

We begin by simply adding an interactive term between the revolution dummy and each measure of sectoral output growth to the equation above as follows:

$$dy_{it} = \beta_0 + \beta_1\, dinv_{it} + \beta_2\, dreer_{it} + \beta_3\, dm_{it} + \beta_4\, dcpi_{it} + \sum_k \beta_k revdummy * sector$$

The results from Table 5 indicate that, in column 1, sectors 2 (Mining-Crude Oil), 3 (Mining-Natural Gas) and 5 (Manufacturing-Oil Products) are not affected negatively by the revolution, as their corresponding coefficients of interest are either positive or insignificant. It is very clear that the resilience of growth in these sectors is attributed to energy production, which is not dependent on aggregate uncertainty and business confidence.[5]

A final observation is that the positive or non-significant revolution/sector interaction term belongs to sectors that have experienced higher growth rates *after* as compared to *before* the revolution. Recall from our discussion in the previous section that we observed that sectors 1 (Agriculture), 2 (Mining-Crude Oil), 7 (Electricity), 10 (Transportation) and 17 (Real Estate Activities) are the sectors in this category. These same sectors are among the non-affected sectors, as illustrated in the above regressions. This holds true regardless of the specification used, signifying the resilience of these sectors to a deterioration in economic conditions, post-revolution.

3.2 The Quantile treatment effect on the treated (QTT)

In this sub-section, we provide further evidence that the revolution may have affected different sectors differently by using quantile treatment effects (QTT). There are two advantages/reasons behind using QTT. First, with respect to the quantile estimation approach, we are able to study what happens at different quantiles of sectoral growth rates. In other words, we can ascertain whether the most or least rapidly growing sectors fared better or worse after the revolution. Second, by focusing on the treatment effect we can ascertain what may be the closest measure to an examination of the "causal effect" of the revolution in terms of variation in sectoral growth.

While the revolution has had a negative and statistically significant impact on industries in Egypt, there may not be an average representative industry of the entire distribution. For

circulation and demand deposits. Finally, we use the real effective exchange rate to measure relative competitiveness with respect to major trading partners for Egypt, mainly in Europe and the United States.

[5] In other columns in the table, we use different specifications as a means to check the robustness of our findings. As can be seen from columns 2 and 3 in Table (5), adding *dgcomm* or *dfreserve* delivers almost the same result. In columns 2 and 3, the non-affected sectors are 1, 2, 3, 5, 7, 10, 15 and 17. These sectors are: Agriculture, Mining Crude Oil, Mining Natural Gas, Manufacturing of Oil Products, Electricity, Transportation, Insurance & Social Security and Real Estate Activities, respectively. The resilience of these sectors stems from the nature of the output, which is less dependent on external demand and less vulnerable to cyclicality in domestic consumption. All other sectors report a negative and significant coefficient on the variable of interest. These are sectors 4 (Other Mining), 6 (Other Manufacturing), 8 (Water & Sewerage), 9 (Construction Building), 11 (Communication & Information), 12 (Suez Canal), 13 (Internal Trade), 14 (Financial Intermediation), 16 (Restaurants & Hotels), 18 (Education), 19 (Health) and 20 (Other Services). Complete results are not reported for space considerations, but are available from the authors upon request.

example, we do not know whether this average effect holds at the bottom versus the top of the distribution of sectoral growth rates. Specifically, it is not clear yet whether the negative impact on the distribution is applicable in cases of sectors with low or high initial growth rates pre the revolution. Obviously, if we only study average effects, we may miss substantial heterogeneity across industries. Thus, to study what transpires at different quantiles of the distribution, we employ quantile techniques.

As for the treatment effect, this constitutes the second block of our empirical investigation. The advantage of this method is that it gives us the opportunity to assess the "*causal*" effect of the revolution on the distribution of the outcome variable (sectoral growth rates). Combining the two, we are interested in estimating quantile treatment effects on the treated (QTT). This procedure involves two steps. The first is to non-parametrically estimate the propensity score.[6] In general, depending on the type of endogeneity of the treatment and the definition of the estimand, one may find four methods of estimating the QTT (see Frölich and Melly 2010). Variation across methods pertains to endogenous or exogenous treatments and between conditional and unconditional quantile effects. Conditional quantile effects are defined conditionally on the value of the regressors, whereas unconditional effects summarize the causal effect of a treatment for the entire population.[7]

As stated earlier, the key contribution of the analysis revolves around considering the Egyptian revolution in 2011Q1 as our treatment. Since this was clearly an exogenous event, the relevant techniques are those proposed by Koenker and Bassett (1978) and Firpo (2007) (see previous footnote). The important step is the construction of the treated versus control sectors. To do this, we use information from the previous sub-section.

A natural choice would be to choose sectors that were not negatively affected by the revolution, as control sectors. To decide on control sectors, we resort to the most restrictive definition of the control group. This would consist of the largest set of sectors with non-negative revolution/sector dummy that are *common* among all specifications and robustness checks reported earlier. Accordingly, the control sectors comprise sectors 2 (Mining-Crude Oil), 3 (Mining-Natural Gas) and 5 (Manufacturing- Oil Products).[8] We label these three sectors as control sectors, and the remaining seventeen as treated sectors.

It is instructive to first look at the distribution of the outcome variable, i.e., the growth rates of different industries in our case. Figure 1 plots this quantile distribution, and it appears to be reasonably symmetric. Table 6 provides distributional summary statistics of the 10 quantile groups.

As in Firpo (2007), the QTT for quantile τ can be written:

$$QTT = q_{1,\tau \mid D=1} - q_{0,\tau \mid D=1}$$

$$= inf_q \{Pr[Y_1 \leq q] \geq \tau - inf_q \{Pr[Y_0 \leq q] \geq \tau\}$$

$$= inf_q \{Pr[f(Y;X = x_1; D=1) \leq q] \geq \tau - inf_q \{Pr[f(Y;X = x_1; D=0 \leq q] \geq \tau\}$$

6 Rosenbaum and Rubin (1983) define propensity scores, *p(X),* as the conditional probability of receiving the treatment given the covariates.

7 According to Frölich and Melly 2010, if quantile effects are conditional and treatment is exogenous (conditional on covariates) then the estimator proposed by Koenker and Bassett (1978) is the most appropriate. If the treatment is endogenous, the IV estimator of Abadie, Angrist, and Imbens (2002) is applied. Third, for estimating unconditional quantile effects, one would adopt the approach proposed by Firpo (2007), when the treatment effect is exogenous, and by Frölich and Melly (2008), when the treatment effect is endogenous. Surveys of the relevant literature include Imbens and Wooldridge (2009), while applications include Martincus and Carballo (2010), among others.

8 Using different specifications has only added to these three sectors but they were always among those reported to be non-negatively affected.

where *inf* denotes the inverse function, while $D=1$ represents the treatment and $D=0$ represents no treatment. In our context, treatment corresponds to those sectors which were negatively affected by the revolution; while no treatment/control sectors are those which were not adversely affected. In other words, the treatment/control dummy variable is a dummy variable that takes the value of zero for sectors 2, 3 and 5 and one otherwise. Of course, we need to estimate the counterfactual quantile for the treated group, $q_{0,\tau \mid D=1}$, as it is unobserved.

Each sector is either treated with a corresponding (outcome) sector output growth rate (Y_1), or not (Y_0). Only one of these outcomes is observed for every sector. This is the so called fundamental problem of causal inference (see Holland 1986). The distribution of observable covariates among the treated is represented by x_1. We want to estimate $f(Y;X=x_1;D=0)$, which is the counterfactual output growth rate conditional distribution among those sectors which were not treated to test if their observable characteristics were identical to the observable characteristics of the treated group.

Firpo (2007) estimates the QTT as the difference between the unconditional quantiles of two marginal distributions: the actual treated distribution and the counterfactual control distribution at any given quantile. For purposes of identifying the quantiles and the QTT, we require two assumptions, the strong ignorability assumption due to Rosenbaum and Rubin (1983), and the uniqueness assumption. The strong ignorability assumption requires two conditions to hold; namely, the "selection on observables" assumption and the common support condition. The former, sometimes referred to as the conditional independence or unconfoundedness assumption, stipulates that potential outcomes must be independent of the treatment. The latter requires that all treated sectors have a counterpart in the untreated group.

Under these assumptions, Firpo (2007) provides a consistent estimator for the QTT as follows[9]:

$$\widehat{QTT} = \hat{q}_{1,\tau \mid D=1} - \hat{q}_{0,\tau \mid D=1}$$

$$= argmin_q \sum_{i=1}^{N} \hat{w}_{1,i \mid D=1}\, \rho_\tau(Y_i - q) - argmin_q \sum_{i=1}^{N} \hat{w}_{0,i \mid D=1}\, \rho_\tau(Y_i - q)$$

where $\hat{w}$ is the weight and ρ is the check function.[10] Koenker and Bassett (1978) were the first to propose the estimation of QTT by minimizing a sum of check functions, $\rho_\tau(.)$. In the estimator used by Firpo (2007), we have a *weighted* sum of check functions, reflecting the fact that the distribution of observable covariates differs in the treated versus the untreated group, where the weight of each unit is given by $\hat{w}_{j,i}$. Weights are calculated from propensity scores using a logistic power series approximation following Hirano, Imbens and Ridder (2003).

Results are presented in Tables 7, using the methodology of Firpo (2007), and in Table 8, using the Koenker and Bassett (1978) methodology. Regardless of the methodology used, the evidence remains robust. The negative impact of the revolution only appears at the top of the distribution of the outcome variable. This is to say that sectors that had the fastest growth rates before the revolution have been the most adversely affected by the economic slowdown post-revolution. We can see a negative and statistically significant estimate on the coefficient of interest only in the sixth quantile and upwards, while the first five quantiles are either positive or insignificant. This means that it is the fastest growing sectors (those with growth rates of 2% and above) that have been most negatively impacted

[9] The Firpo (2007) estimation method is essentially a reweighed version of the procedure proposed by Koenker and Bassett (1978) for the quantile estimation problem.

[10] A check function $\rho_\tau(x) = \tau * x$ if $x \geq 0$ and $(\tau-1)*x$ if $x<0$ (see Koenker and Bassett 1978 for more details).

by the revolution. Furthermore, we can see that the magnitude of the coefficient is increasing from the sixth to the seventh quantile, from the seventh to the eighth and from the eighth to the ninth quantile. This implies that the faster the sector had been growing before the revolution, the harder it was hit by the revolution. In other words, fast growing sectors were more vulnerable to the revolution, while sectors that had relatively slower growth rates before the revolution have proven to be more resilient.

3.3 The impact of the revolution: A growth diagnosis QTT approach

In the previous section, we presented evidence that the January 25, 2011 revolution in Egypt has affected different sectors differently. We have been able to identify which sectors were negatively affected by the revolution, and which sectors were relatively less vulnerable or more resilient. Our analysis does not stop here, however, as we are yet to analyze the impact of specific explanatory variables to explain such results. Why have some sectors been more vulnerable relative the revolution while others have not? We attempt to provide an answer to this question using a growth diagnosis approach.

Using the QTT methodology in the previous section, we were able to conclude that the sectors at the top of the distribution of the outcome variable (growing faster pre the revolution) have been relatively more vulnerable than others since the revolution. Our results in table (8) provide additional interesting information that reveals the factors driving such variation across sectors.

The evidence in Table 8 suggests that the more resilient sectors are the ones that are more adversely affected by a real devaluation, not those at the top of the distribution, i.e., faster growing sectors that are more adversely affected by the revolution. This is supported by the coefficients on the (*dreer*) variable, which are negative and statistically significant only for the first three quantiles. As an increase in the real effective exchange rate implies a depreciation of the Egyptian currency, the evidence supports efforts by the central bank of Egypt to defend the Egyptian pound post-revolution. Absent these efforts, further depreciation of the pound could have increased the cost of intermediate input, widening the scope of sectoral vulnerability, post–revolution, with more devastating effects on the Egyptian economy.

Although not reported here, it is worth mentioning, however, that combining (*dreer*) with (*dm2*) instead of (*dm1*), the coefficient on (*dreer*) becomes positive and statistically significant for sectors at the top of the distribution. In this case, a real depreciation not only hurts the slower growing sectors but also helps the faster growing ones. Such evidence points clearly that the sectors that have been mostly adversely affected by the revolution are export oriented. While stemming the risk of depreciation may have supported the resilience of less export-oriented sectors post-revolution, it has limited the scope of recovery for export-oriented sectors. Hence, by stemming the risk of depreciation, the central bank of Egypt may have also limited the scope to grow international reserves post-revolution, which is consistent with the fact that it has lost nearly $20 billion of international reserves during this span.

Consumer price inflation (*dcpi*) and investment growth (*dinv*) seem to have similar impacts on sectors across the entire distribution. Higher inflation negatively impacts all sectors, while higher growth rates of investment positively impact all sectors regardless of their position on the distribution of the outcome (sectoral growth rate) variable. The evidence establishes priorities to stem higher inflation and mobilize investment growth to sustain economic recovery across all sectors of the Egyptian economy.

Higher growth rate of the money supply (*dm1*), however, negatively affects slower growing sectors at the bottom of the distribution, while it helps faster growing sectors at the top of the distribution. An increase in money supply, holding money demand constant, would typically decrease interest rates and increase investment opportunities. This should eventually lead to a positive effect on sectoral growth. Our results seem to suggest that this logic only holds true for the sectors at the top of the distribution of the outcome variable. One possibility is that the faster growing sectors seem to be more dependent on credit availability, with possible crowding out effects on available credit that would have supported investments in the slower growing sectors.

An interesting question in this regard is which sectors are at the bottom versus the top of the growth distribution? A closer look at our dataset reveals that sectors 1 (Agriculture), 9 (Construction Building), 11 (Communication & Information), 12 (Suez Canal), 13 (Internal Trade), 16 (Restaurants & Hotels) and 19 (Health) are the sectors which mostly have growth rates of 2% and above placing them in the sixth quantile and upwards. In other words, we can roughly say that these sectors are the ones witnessing the worst hit by the revolution, relative to their growth performance pre the revolution.11 In general, these sectors are more vulnerable to external shocks and cyclicality in domestic spending.

Finally, it is worth mentioning that the above findings are mostly robust to the use of different variables. They remain robust upon replacing (*dm1*) with (*dm2*) and (*dreer*) with (*dexr*) and trying various possible combinations of these explanatory variables.

3.4 Growth diagnosis: The pooled OLS approach

The next question to ask is what is driving the above result? Which factors are behind such a differential impact of the revolution on different sectors? To answer this question, we use information from the QTT results in Table (8) above and link them to the following pooled OLS regression. Specifically, we create an interaction dummy for every RHS explanatory variable multiplied by the revolution and sectoral dummies, as follows:

$$dy_{it} = \beta_0 + \beta_1\, dinv_{it} + \beta_2\, dreer_{it} + \beta_3\, dm1_{it} + \beta_4\, dcpi_{it}$$

$$+ \sum_k \beta_k\, revdummy * sector * dinv + \sum_k \beta_k\, revdummy * sector * dreer$$

$$+ \sum_k \beta_k\, revdummy * sector * dm1 + \sum_k \beta_k\, revdummy * sector * dcpi$$

Results are presented in Table 9. It is clear from this table that different explanatory variables have had differential impacts on different sectors post-revolution.

Recall that the QTT results from Table 8 suggested that observations in the bottom two quantiles of the outcome variable were negatively affected by growth in the money supply, while the top three quantiles were positively affected. Again, the results from Table 8 using QTT are in line with those from Table 9 using pooled OLS.[12] Once again, the evidence reaffirms a higher dependency of the faster growing sectors on monetary growth and credit availability. While monetary policy has been easing since the revolution, higher fiscal deficits and increased reliance by the government on domestic borrowing have limited the effectiveness of accommodating monetary policy to revive growth in sectors adversely affected by the revolution that had helped sustain higher growth pre the revolution.

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[11] This does not mean that other sectors have never witnessed growth rates above 2% throughout the sample period. It only means that these specific sectors identified above have witnessed growth rates of 2% and above (sixth quantile and above) most of the time throughout the sample period, while others have lagged behind for the most part.

[12] Sectors 1 (Agriculture), 9 (Construction Building), 16 (Restaurants & Hotels) and 19 (Health) report a positive and statistically significant coefficient, as predicted by the QTT results. On the other hand, sectors 8 (Water & Sewerage), 14 (Financial Intermediation) and 17 (Real Estate Activities) which roughly fall among the bottom two quantiles of the outcome variable, report negative and significant money supply coefficients.

In sum, results from our growth diagnosis analysis, using either QTT or pooled OLS, provide roughly the same information. Since the revolution is an exogenous event, it has created a natural experiment environment where we are able to distinguish between vulnerable and resilient sectors. Furthermore, the results above allow the policy maker to identify the underlying strengths and constraints of different sectors and priorities for macro policies to help mobilize recovery and support sectoral growth.

4. Conclusion and Policy Implications

The Egyptian economy has been under great pressure in the wake of its revolution. Lingering uncertainty and slow reaction by macro policies to invoke necessary stimulus packages have diminished the scope of recovery across the economy. The revolution and surrounding episodes of political upheaval had a short-lasting impact on economic activity, beyond which the economy should have been positioned on the road to a faster recovery aided by the necessary macroeconomic policies. The fact that the recovery slope for Egypt proved to be much steeper than what was originally envisaged demands a thorough evaluation of the performance of the economy post-revolution.

A first step towards taking stock of policy shortcomings is to understand the economic constraints prevailing in such an environment. The goal of this paper is to identify the constraints and strength of the Egyptian economy by *diagnosing* the performance of the various sectors of the economy using the 2011 Egyptian revolution as a natural experiment.

We attempt to address this question in a number of building blocks that complement each other. We first show that the revolution had, on average, an adverse impact on the Egyptian economy. Secondly, we show that different sectors have been affected differently. We identify such sectors as well as their characteristics. The main upshot of the empirical evidence is that the faster growing sectors before the revolution are the ones that have been most adversely affected by the revolution. Those sectors have been more vulnerable to deterioration in economic policies and less stimulated by the prevailing macroeconomic policies, compared to historically slower growing sectors that have established more resilience.

To shed additional light on the difference across sectors of the economy, we then follow a growth diagnostic approach to identify which variables are causing such a differential impact post-revolution across sectors. We conclude that the faster growing sectors are mainly constrained by continuous increases in overall prices. On the other hand, these sectors benefit from higher money supply growth rates as well as real currency depreciation. In this connection, these sectors have been more constrained after the revolution by the challenge to access credit and revive export competitiveness, given growing demand for domestic financing of government operations and continued intervention by the central bank to stem further depreciation of the Egyptian pound.

The evidence also reveals limitations that may have hampered growth of the remaining sectors before the revolution and helped support their resilience to the slowdown post-revolution. These sectors are more vulnerable to depreciation of the pound, reflecting their higher dependency on imported intermediate goods. In this connection, these sectors were challenged before the revolution by the deliberate strategy by the central bank to depreciate the pound to establish competitiveness, but were helped by the reversal in course, to stem depreciation of the currency after the revolution. Further, sectors that fared worse in terms of growth before the revolution were those that were constrained by access to credit, relative to the faster growing sectors of the economy. Post-revolution, the slower growth of the latter group may have eased credit constraints in support of resilient growth of the former.

Our results provide clear insights to policy makers on the strengths as well as the key constraints which need to be relaxed to further unlock the growth potential of the Egyptian economy. Using the Egyptian revolution as a natural experiment (exogenous treatment), we are able to identify the vulnerable versus more resilient sectors of the economy. We hope that our growth diagnosis approach can help policy makers design effective industrial policies with regard to exchange rate management, easing credit and financial constraints, and stemming inflationary pressures, with the ultimate objective of attaining the aspirations of the public in the outset of a new era.

To that end, the evidence emphasizes the importance of relaxing constraints on credit availability to support higher growth across sectors of the economy. Fiscal consolidation is key to ease credit constraints and help mobilize growth in the private sector of the economy. Higher inflation is detrimental to growth as it erodes export competitiveness and increases the cost of domestic production and dependency on imports. Exchange rate management should be geared towards supporting competitiveness and stemming inflation to anchor expectations and maintain external stability. A comprehensive industrial policy that seeks to align sectoral growth with employment opportunities, underpinned by prudent macro policies, will help position Egypt on a fast road to attain long-lasting inclusive growth.

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Figure 1: Quantile Distribution of the Outcome Variable

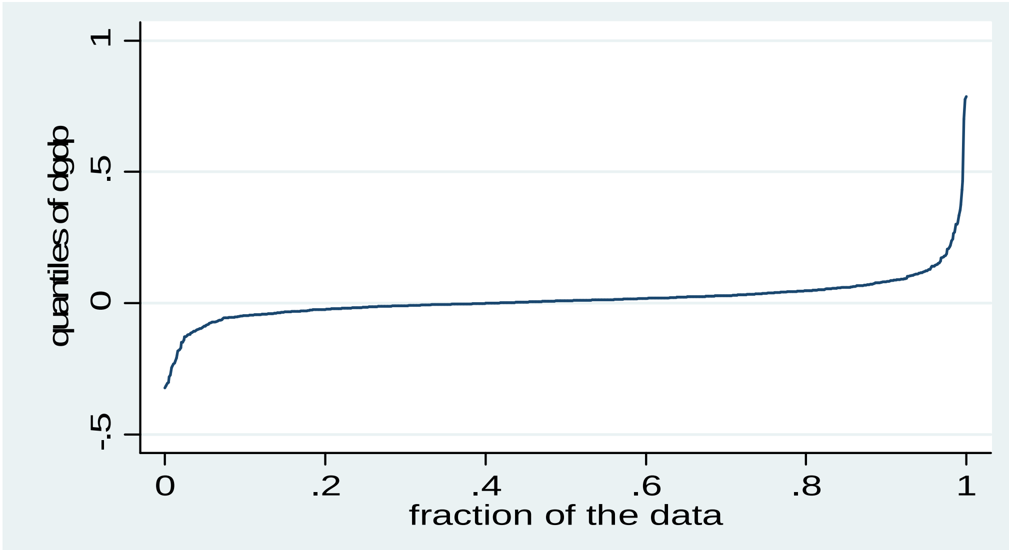

Table 1: Summary Statistics

	Mean	Std. Dev.	Min	Max
	Before Revolution: 2002Q4-2010Q4			
dy	0.017	0.092	-0.313	0.787
dinv	-0.009	1.154	-15.936	15.174
dreer	0.002	0.051	-0.192	0.077
dm1	0.039	0.017	-0.001	0.091
	After Revolution: 2011Q1-2012Q2			
dy	0.005	0.047	-0.322	0.115
dinv	0.097	1.439	-1.562	14.497
dreer	0.002	0.021	-0.022	0.040
dm1	0.031	0.025	0.006	0.086

Table 2: Summary Statistics of Sectoral Growth Rates

	Mean	*Std. Dev.*	*Min*	*Max*
	Before Revolution: 2002Q4-2010Q4			
Sector 1: Agriculture	0.007	0.046	-0.106	0.104
Sector 2: Mining-Crude Oil	0.010	0.097	-0.244	0.265
Sector 3: Mining-Natural Gas	0.043	0.178	-0.313	0.465
Sector 4: Other Mining	0.034	0.192	-0.304	0.776
Sector 5: Manufacturing-Oil Products	0.025	0.073	-0.138	0.219
Sector 6: Other Manufacturing	0.009	0.060	-0.105	0.271
Sector 7: Electricity	0.005	0.029	-0.066	0.077
Sector 8: Water & Sewerage	0.009	0.034	-0.040	0.180
Sector 9: Construction Building	0.017	0.045	-0.089	0.114
Sector 10: Transportation	0.009	0.034	-0.094	0.082
Sector 11: Communication & Information	0.029	0.083	-0.177	0.334
Sector 12: Suez Canal	0.007	0.070	-0.207	0.179
Sector 13: Internal Trade	0.012	0.068	-0.181	0.152
Sector 14: Financial Intermediation	-0.002	0.057	-0.149	0.177
Sector 15: Insurance & Social Security	0.024	0.127	-0.117	0.701
Sector 16: Restaurants & Hotels	0.036	0.111	-0.280	0.306
Sector 17: Real Estate Activities	0.002	0.031	-0.087	0.089
Sector 18: Education	0.028	0.142	-0.102	0.787
Sector 19: Health	0.014	0.061	-0.107	0.141
Sector 20: Other Services	0.019	0.072	-0.070	0.374
	After Revolution: 2011Q1-2012Q2			
Sector 1: Agriculture	0.015	0.020	-0.005	0.048
Sector 2: Mining-Crude Oil	0.025	0.037	-0.012	0.078
Sector 3: Mining-Natural Gas	0.021	0.025	-0.009	0.055
Sector 4: Other Mining	0.006	0.026	-0.031	0.038
Sector 5: Manufacturing-Oil Products	0.018	0.031	-0.012	0.077
Sector 6: Other Manufacturing	-0.004	0.066	-0.126	0.066
Sector 7: Electricity	0.008	0.035	-0.027	0.064
Sector 8: Water & Sewerage	0.005	0.042	-0.054	0.068
Sector 9: Construction Building	0.007	0.069	-0.100	0.076
Sector 10: Transportation	0.012	0.033	-0.046	0.043
Sector 11: Communication & Information	-0.013	0.019	-0.045	0.003
Sector 12: Suez Canal	-0.001	0.020	-0.026	0.025
Sector 13: Internal Trade	0.004	0.029	-0.044	0.043
Sector 14: Financial Intermediation	-0.005	0.047	-0.046	0.085
Sector 15: Insurance & Social Security	0.015	0.023	-0.011	0.047
Sector 16: Restaurants & Hotels	-0.022	0.160	-0.322	0.115
Sector 17: Real Estate Activities	0.007	0.025	-0.036	0.032
Sector 18: Education	0.006	0.016	-0.010	0.027
Sector 19: Health	0.004	0.029	-0.039	0.033
Sector 20: Other Services	0.008	0.016	-0.012	0.027

Table 3: Unit Root Tests

Variable	Description	Level		First Difference	
		ADF	**ERS**	**ADF**	**ERS**
m1	Narrow money	-1.011	1924.240	-5.321***	1.741***
m2	Broad money	-2.571	2494.618	-5.408***	1.544***
cpi	Consumer price index	0.505	864.642	-4.261***	1.339***
ppi	Producer price index	-1.401	90.939	-4.529***	0.927***
neer	Nominal effective exchange	-8.212***	93.630	-5.463***	2.442**
reer	Real effective exchange rate	-0.664	26.077	-5.945***	3.021*
exr	Exchange rate	-6.271***	26.055	-3.357**	1.714***
gcomm	Global commodity prices	-1.733	19.863	-4.636***	0.723***
freserve	Foreign reserves	-1.447	4.251	-2.141**	0.001***

Notes: *** Significant at the 1% significance level, ** Significant at 5%, * Significant at 10%. Numbers reported are the computed t-statistics for ADF tests, and p-statistic for ERS test. The null hypothesis in both tests is the series contains a unit root.

Table 4: Pooled OLS

	Dependent Variable: Mean Output Growth (dy)	**dy**	**dy**	**dy**
dinv	0.002	0.003	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
dreer	0.015	0.015	0.030	0.030
	(0.055)	(0.056)	(0.052)	(0.052)
dm1	0.438	0.438	-0.047	-0.047
	(0.189)	(0.192)	(0.237)	(0.240)
dcpi	-0.568	-0.568	-0.634	-0.634
	(0.241)**	(0.243)**	(0.283)**	(0.287)**
dgcomm			0.033	0.033
			(0.035)	(0.036)
revdummy	-0.013	-0.013	-0.012	-0.013
	(0.005)**	(0.004)**	(0.004)**	(0.004)**
constant	0.028	0.033	0.033	0.042
	(0.008)***	(0.007)***	(0.011)***	(0.011)***
Sector dummy	N	Y	N	Y
Observations	780	780	780	780
R-squared	0.02	0.03	0.02	0.03

Notes: Robust standard errors (clustered by sector) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Pooled OLS with Revolution/Sector Dummies

	dy	dy	Dy
dinv	0.003	0.003	0.002
	(0.002)	(0.002)	(0.002)
dreer	0.015	0.030	0.011
	(0.056)	(0.052)	(0.056)
dm1	0.437	-0.047	-0.017
	(0.192)	(0.240)	(0.182)
dcpi	-0.568	-0.634	-0.520
	(0.244)**	(0.288)**	(0.241)**
dgcomm		0.033	
		(0.035)	
dfreserve			0.075
			(0.017)***
rev*sector1	-0.012	-0.002	0.017
	(0.003)***	(0.003)	(0.006)***
rev*sector2	0.007	0.007	0.026
	(0.003)**	(0.003)**	(0.006)***
rev*sector3	0.003	0.002	0.022
	(0.003)	(0.003)	(0.006)***
rev*sector4	-0.012	-0.012	-0.012
	(0.003)***	(0.003)***	(0.005)**
rev*sector5	-0.001	-0.001	0.018
	(0.003)	(0.003)	(0.006)***
rev*sector6	-0.022	-0.023	-0.003
	(0.003)***	(0.003)***	(0.006)***
rev*sector7	-0.009	0.010	0.009
	(0.003)***	(0.003)***	(0.006)
rev*sector8	-0.013	-0.013	-0.013
	(0.003)***	(0.003)***	(0.003)***
rev*sector9	-0.011	-0.011	-0.011
	(0.003)***	(0.003)***	(0.003)***
rev*sector10	-0.005	-0.005	0.013
	(0.003)*	(0.003)*	(0.006)**
rev*sector11	-0.031	-0.03	-0.012
	(0.003)***	(0.003)***	(0.006)**
rev*sector12	-0.020	-0.020	-0.020
	(0.003)***	(0.003)***	(0.003)***
rev*sector13	-0.014	-0.014	-0.014
	(0.003)***	(0.003)***	(0.003)***
rev*sector14	-0.023	-0.024	-0.024
	(0.003)***	(0.003)***	(0.003)***
rev*sector15	-0.009	-0.009	0.010
	(0.005)*	(0.006)	(0.009)
rev*sector16	-0.041	-0.04	-0.021
	(0.003)***	(0.003)***	(0.006)***
rev*sector17	-0.011	-0.011	0.008
	(0.003)***	(0.003)	(0.006)
rev*sector18	-0.011	-0.012	-0.011
	(0.003)***	(0.003)***	(0.003)***
rev*sector19	-0.014	-0.014	-0.014
	(0.003)***	(0.003)***	(0.003)***
rev*sector20	-0.009	-0.010	-0.010
	(0.003)***	(0.003)***	(0.003)***
Constant	0.028	0.033	0.028
	(0.008)***	(0.012)**	(0.008)***
Observations	780	780	780
R-squared	0.02	0.02	0.02

Notes: Robust standard errors (clustered by sector) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Distributional Summary Statistics, 10 quantile groups

Quantile Group	Obs	Quantile	% of median	Share %	C Share %
1	86	-0.05	-484.08	-73.23	-73.23
2	86	-0.02	-239.72	-22.25	-95.48
3	86	-0.01	-96.67	-9.87	-105.36
4	86	-0.00	-2.85	-2.86	-108.21
5	86	0.01	99.24	3.16	-105.05
6	86	0.02	193.94	8.88	-96.17
7	86	0.03	300.88	15.48	-80.70
8	86	0.05	490.77	24.70	-56.00
9	86	0.08	844.12	40.36	-15.64
10				115.64	100.00

Notes: Quantile: quantiles k = 1,2,...,m-1, for m = # quantile groups; % of Median: the quantiles expressed as a percentage of median(x); Share %: the quantile group share of x in total x, C Share %: Cumulative group share

Table 7: Quantile Treatment Effect on the Treated (Firpo 2007)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
QTT: rev	0.026	0.009	-0.0001	-0.002	-0.009	-0.018	-0.034	-0.047	-0.077
	(0.026)	(0.010)	(0.007)	(0.007)	(0.008)	(0.010)*	(0.012)***	(0.013)***	(0.025)***
Obs	780	780	780	780	780	780	780	780	780

Notes: All other regressors are included but not reported. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Quantile Treatment Effect on the Treated (Koenker and Bassett 1978)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
QTT: rev	0.045	0.007	0.006	-0.002	-0.009	-0.025	-0.037	-0.049	-0.070
	(0.034)	(0.009)	(0.007)	(0.007)	(0.008)	(0.010)**	(0.011)***	(0.010)***	(0.026)***
dinv	0.001	0.002	0.003	0.003	0.002	0.002	0.002	0.001	0.001
	(0.002)	(0.002)	(0.001)**	(0.001)**	(0.001)*	(0.001)**	(0.001)**	(0.001)	(0.002)
dreer	-0.134	-0.088	-0.081	-0.036	-0.012	-0.004	0.017	0.042	0.055
	(0.075)*	(0.049)*	(0.042)**	(0.043)	(0.042)	(0.041)	(0.044)	(0.053)	(0.079)
dm1	-0.755	-0.315	-0.206	-0.121	0.020	0.065	0.200	0.342	0.663
	(0.292)***	(0.153)**	(0.122)*	(0.114)	(0.115)	(0.119)	(0.126)	(0.151)**	(0.275)**
dcpi	-0.269	-0.395	-0.585	-0.591	-0.705	-0.773	-0.906	-1.069	-0.864
	(0.279)	(0.171)**	(0.144)***	(0.137)***	(0.134)***	(0.136)***	(0.137)***	(0.154)***	(0.365)**
cons	-0.057	-0.006	0.008	0.022	0.034	0.057	0.077	0.101	0.134
	(0.033)*	(0.010)	(0.009)	(0.008)***	(0.009)***	(0.011)***	(0.012)***	(0.011)***	(0.030)***
Obs	780	780	780	780	780	780	780	780	780

Notes: Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 9: Pooled OLS: Growth Diagnosis

	dy			
dinv	0.002			
	(0.003)			
dreer	0.029			
	(0.061)			
dm1	0.337			
	(0.208)			
dcpi	-0.629			
	(0.265)**			
constant	0.019			
	(0.007)**			
	rev*sector *dinv	**rev*sector *dreer**	**rev*sector *dm1**	**rev*sector *dcpi**
sector1	0.054	3.212	1.062	1.023
	(0.005)***	(1.310)***	(0.399)**	(0.339)***
sector2	-0.009	-0.961	1.300	2.308
	(0.004)**	(0.633)	(0.429)***	(0.335)***
sector3	-0.006	1.732	-1.264	2.225
	(0.003)**	(1.058)*	(0.557)**	(0.411)***
sector4	0.032	1.943	2.711	1.061
	(0.006)***	(0.400)***	(0.443)***	(0.392)**
sector5	-0.012	-0.611	1.012	1.180
	(0.003)***	(0.467)	(0.945)	(0.351)***
sector6	-0.016	-0.481	2.974	3.370
	(0.003)***	(0.362)	(2.765)	(0.357)***
sector7	-0.100	-7.454	-2.147	0.534
	(0.009)***	(1.667)***	(1.113)*	(0.376)
sector8	0.030	-1.111	-1.064	1.176
	(0.003)***	(1.743)	(0.307)	(0.359**)
sector9	0.042	0.681	1.454	2.478
	(0.004)***	(0.329)***	(1.018)	(0.398)***
sector10	-0.059	-1.044	0.889	1.749
	(0.004)***	(0.316)***	(0.681)	(0.332)***
sector11	-0.035	0.361	-0.898	-0.251
	(0.005)***	(0.087)***	(0.449)**	(0.354)
sector12	0.014	-0.786	-2.285	-1.588
	(0.033)	(0.725)	(0.192)***	(0.343)
sector13	0.001	2.211	-3.503	1.543
	(0.004)	(0.545)***	(0.281)***	(0.288)***
sector14	-0.031	-4.725	-6.245	-0.746
	(0.004)***	(1.464)***	(0.525)***	(0.409)*
sector15	-0.001	-1.139	-3.202	0.923
	(0.003)	(1.750)	(0.425)***	(0.333)*
sector16	-0.301	2.437	5.896	8.135
	(0.007)***	(0.692)***	(2.342)**	(0.416)***
sector17	-0.097	-2.501	-5.876	-6.510
	(0.006)***	(0.780)***	(1.333)***	(0.302)**
sector18	-0.012	-0.222	1.261	0.427
	(0.002)***	(0.140)	(1.237)	(0.357)
sector19	-0.095	-0.934	1.254	3.910
	(0.011)***	(0.132)**	(0.499)**	(0.640)***
sector20	0.008	-0.084	-0.244	0.965
	(0.002)***	(1.643)	(0.179)	(0.353)**
Observations	780			
R-squared	0.06			

Notes: Robust standard errors (clustered by sector) in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%