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INFORMAL COMPETITION IN EGYPT

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Abstract

This paper investigates the role of informal firms' competition in determining the micro-level effect of cronyism on formal-firms' productivity in the aftermath of the 2011 Egyptian revolution. Based on the World Bank panel Enterprise Surveys, we follow a constructive approach to indicate politically connected firms based on the findings of the previous literature. Using a propensity score reweighting - difference-in-difference estimator, we find that being a crony firm after the revolution could generate unsustainable gains in terms of productivity. This is mostly due to cronyism externalities that engenders a stronger intensity of informal competition, which jeopardizes any increase in productivity and creates a large disequilibrium at the firm level. We also provide evidence that crony firms' excess in labor is the main channel through which this effect occurs. Hence, crony firm survival in Egypt depends on their ability to balance between the sustain provision of privileges and the threats imposed by the growth of the informal sector.

Keywords: Crony firms, Informal competition, Firms' productivity, Egypt.

JEL Classifications: D72, D24, L25, O17

I. Introduction and literature review

Cronyism has always been one of the important features of the Egyptian formal private sector. Formal firms have always been trapped between two (extreme) type of firms; large connected firms (to the army or to the political system) and smaller informal firms (Chekir & Diwan, 2014). From one hand, most of the literature documenting firms' political connections in Egypt argued about their profitability comparing to non-connected firms, especially due to the large set of privileges these firms gain from being connected.

From the other hand, most of the studies into the informal sector considered informal firms as unproductive, small and as the main source of unfair competition (Harris & Todaro, 1970; Hart, 1973; Rauch, 1991; Djankov et al., 2004; La Porta & Shleifer, 2008 & 2014). Therefore, most of existing studies into political connections (or informality) showed its impact on connected (or informal) firms' value and on economic performance. Although the common mechanism driving connected and informal firms -advantage in cost through privileges for the former and evasion of taxes for the last- previous studies came short of providing evidence associating the impact of connected and informal firms on economic performance. This paper tries to fill this gap by testing the combined effect of cronyism and informality (more precisely, informal firms' competition) on economic performance.

A decade of research documented the economic advantages and benefits that firms gain by being connected to the political system (Fisman, 2001; Faccio, 2006; World Bank, 2014; Diwan et al. 2016; Acemoglu et al., 2017). Yet, the value of connected firms largely depends on the form of connection (i.e. businessperson elected as prime minister vs. as member of parliament as shown in Faccio, 2006), on the prevalence of exogenous shocks (i.e. rumors about the actual president as shown in Fisman, 2001 and Acemoglu et al., 2017), and more significantly on the set of provided privileges (as explained in Johnson & Mitton, 2003; Cull & Xu, 2005; Diwan et al., 2016; World Bank, 2014). However, most of these studies agreed on the negative impacts that political connections have on aggregate productivity growth.

This reported negative effect of political connections is very much attributed to the Aghion's explanation of the Schumpeterian and escape-competition effects following firms' entry threat (see Aghion et al., 2001; Aghion, et al., 2009 and Aghion et al., 2015). According to these effects, when a firm enters a sector closer to the technology frontier, incumbent firms will have more incentive to innovate in order to catch-up with the leader and, hence, to escape competition. Thus, more product market competition (or neck-to-neck competition) will

increase innovation, which triggers productivity growth (the escape-competition effect). However, if this firm enters a sector far below the technology frontier, the Schumpeterian effect of creative destruction will dominate because incumbent firms will no longer be able to survive the competition and will be replaced by more innovative firms (this is the Schumpeterian effect as introduced by Aghion et al., 2005). Accordingly, with the large concentration of connected firms deterring market competition and productivity due to their uneven access to privileges, we argue that a similar Schumpeterian effect will prevail but where un-innovative connected firms will be replacing incumbent ones (Adler, 2016). Therefore, in such a context, connected firms will dominate the market, reduce neck-to-neck competition, as well as incentives to innovate and invest.

This argument could largely relate to the Egyptian private market. Since 2005, the market featured an increasing entry of crony firms in sectors that were previously unconnected. This was mainly due to the increasing influence of Gamal Mubarak (Mubarak's son) and to the large concentration of businesspersons in the cabinet of ministers and in the parliament. Existing studies showing the negative effect of these connected firms on Egypt's economic performance prove that their survival was mainly due to provided privileges.¹ They disproportionately benefit from (among other) better access to finance, energy subsidies, tax advantages, greater market power, and trade protection.

Besides, according to Aghion et al. (2001 & 2015), the main complement to competition policy, encouraging innovation and R&D investments, is patent policy. Imitation usually follows a Schumpeterian effect. However, too much imitation acts as an opponent to growth. From here comes the important role played by informal firms in the Egyptian market. With the absence of an effective patent policy, informal firms' production is mainly composed of counterfeit products that unfairly compete with formal firms' products (OECD, 2009). Considering as well their ability to reduce prices because of their advantage in cost (evasion of taxes and regulation), informal firms –similarly to connected ones- will reduce market competition and growth.

Hence, Egypt is a good example of rather strong autocracy with weak counter power and a large informal sector. The 2011 revolution revealed a lot about the incidence of cronyism and its impact on economic growth. Egypt is also an interesting example in accordance to the size

¹ See World Bank, 2014 and Diwan et al., 2016 for a full documentation of the Egyptian case.

of the informal sector that attained 49.6% of total non-agricultural activities in 2012 (Charmes, 2012). Comparing to other Middle East and North African countries, Egypt is ranked among the highest in the contribution of the informal economy in official GDP and in the share of informal employment in total non-agricultural activities. The persistence of institutional imperfections caused the failure of formal sector's benefits and made the existence of the informal sector legitimate. That is why doing business in Egypt remains very challenging and almost 50% of formal firms report competing against informal ones. In result of the poor business environment, competition stemming from informal firms (hereafter "informal competition") became one of the major obstacles faced by formal firms in Egypt (World Bank, 2014).

Assuming that we can observe and measure political connections and its effects on Egyptian firms' performance, this paper claims the following assumptions. First, the survival of crony firms mostly depends on their ability to draw advantage in costs through their access to multiple privileges. These last allow them to increase in value and profitability but do not translate into sustainable productivity increase. Second, Crony firms (through their access to uneven privileges) create a misallocation of resources that leads to the reduction of domestic competition and incentives to innovate by incumbent firms. These last might decide to exit the market, which might translate into more entry into the informal sector and increase in the intensity of informal competition. This can in turn endanger the productivity of both connected and unconnected firms. Third, increasing cronyism after the revolution could make our two first assumption more striking.

These hypotheses are drawn upon the findings of the previous literature, and more specifically on the findings of Chekir & Diwan (2014), the World Bank (2014), Diwan et al. (2016), and Acemoglu (2017). These authors found that in Egypt and especially before the 2011 revolution, politically connected firms were more profitable, larger in size and more concentrated in high-energy intensity sectors and in industries with higher potential growth. Most of this higher performance was attributed because of policy privileges that provide them with better access to capital and credits from state-owned and private banks, to energy subsidies and to government-owned land or industrial zones. These privileges also allowed them to benefit from fewer licensing restrictions and state regulation and to access fast-track regulatory services. Moreover, these studies found that politically connected firms tend to report less domestic

competitors because they prevent firm entry and push most of unconnected firms to informal (micro) activities.

This paper adds to the underlined literature in several aspects. First, we implement a micro-level analysis to derive empirical findings on the effect of cronyism on firm-level productivity. Furthermore, our model accounts for the first time in the literature for the combined effects of cronyism and informal competition. Second, this paper does not use stock market information or face-to-face interviews with managers to identify connected firms as done in previous studies. It rather uses a firm-level dataset that allow us to better identify connected firms using a constructive approach. Third, we implement an advanced empirical analysis that allows us to document the change in cronyism structure and effect after the 2011 revolution, especially that we can recently observe the rise in power of army businesses in Egypt.²

Our empirical analysis uses the World Bank panel Enterprise Surveys (WBES) on private formal firms' performance in Egypt, which presents an unbalanced panel of 8654 firms surveyed over the years 2004, 2007, 2008, 2013 and 2016. Our model is based on a propensity score reweighting estimation coupled with a Difference-in-Difference approach (PSM reweighted-DID). This methodology allows us to control for self-selection and omitted variable biases. It also allows us to compare the impact of political connection and the combined effect of this last with increasing informal competition on formal firms' productivity in the aftermath of the revolution comparing to before.

Our empirical results are in line and complement the existing literature on cronyism (Fisman, 2001; Faccio, 2006). We first show that cronyism not only increase the value of the firm but can also increase its productivity. Yet, this increase in productivity is not sustainable and mostly depend on firms' ability to avoid its own externalities. Cronyism diminishes the incentives to innovate and competition in the market, which pushes incumbent firms to exit the market and feed the informal sector. This misallocation of resources engenders a stronger intensity of informal competition, which jeopardizes any increase in productivity and creates a large disequilibrium at the firm level. The crony firm becomes no longer able to maintain the excess in labor (main condition to access privileges) and its survival becomes insecure. That is why, the negative impact of cronyism coupled with informal competition after the revolution

² This situation also prevailed during Mubarak's regime because the Egyptian military's financial accounts has always been outside the control of the civilians' government (see Harb, 2003 and Acemoglu et al., 2017 for more details)

is largely strengthen when we consider the case of new connected firms after the revolution comparing to those that remained unconnected.

This paper is laid out as follows. Section II explores the data set and constructs the main variables included in our model. Section III discusses the suggestive evidence generated from the data set. Section IV presents our identification strategy. Section V discusses the reported results and section VI provides the main concluding remarks.

II. Data description

In order to test our hypotheses, we use the World Bank panel Enterprise Surveys (WBES) on private formal firms' performance in Egypt. This data set presents an unbalance panel of 8654 firms surveyed over the years 2004, 2007, 2008, 2013 and 2016.³ The surveys are administrated to a representative sample of firms in the non-agricultural formal private economy including small, medium and large-sized enterprises in different sectors of activity (i.e. manufacturing, mining, construction, hotels, retail & wholesale and other services sectors). The sample design of the WBES is based on stratified random sampling. Three levels of stratifications are used; the sector of activity, size and location. Fully government-owned enterprises were excluded from the survey. This sampling methodology generates an appropriate sample size to benchmark the Egyptian business environment from the perspective of the firm, using face-to-face interviews with the owner or the manager of the firm.

As a first step, we start by cleaning the data set to generate standardized variables available for all years and merge missing variables from individual surveys. We also eliminate inconsistent observations in monetary variables.⁴ We then proceed by creating the main variables included in our model as follows;

Dependent variable: Formal firms' labor productivity and TFP

We start our analysis using a "labor productivity" measure as dependent variable. This measure is considered as the best alternative for the "total factor productivity" measure that is usually hard to estimate using micro-level data from developing countries (Kouamé & Tapsoba, 2018).

³ The data are available and downloadable through the World Bank portal - <http://www.enterprisesurveys.org>

⁴ Extreme values in monetary variables such as sales, labor costs, intermediate inputs and capital costs, have been treated by excluding values that are three standard deviations away from the mean value. About 150 observations turn to missing.

According to equation (1) below, for each firm (i) in year (t), the logarithm of formal firms' annual labor productivity is the ratio of firms' value added at the end of the fiscal year in Egyptian pounds (in real term) to the total number of permanent and full-time workers at the end of the same fiscal year.

$$lprod_{it} = \ln \frac{\text{Value added at the end of fiscal year}_{it}}{\text{Total permanent and full time workers at the end of the fiscal year}_{it}} \quad (\text{eq.1})$$

Where, *Value added at the end of fiscal year* _{it} is the difference between firm (i) total sales revenues at the end of the fiscal year and its total annual cost of raw material and intermediate goods at the end of the same fiscal year.

We, then, compile all available information on firms' cost from the surveys in order to estimate a simplified production function in the spirit of Şeker & Saliola (2018)'s paper in which they estimate TFP in multiple developing countries based on the WBES.⁵ We estimate firm-level TFP using a simple Cobb-Douglas production function with three factor of productions (capital, labor and material) as follows:

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta} M_{it}^{\gamma} \quad (\text{eq. 2})$$

According to equation (2), for each firm (i) in year (t), Y_{it} is firm-level output measured as the total annual sales revenues. K_{it} is the total annual net book value of machinery, vehicle and equipment. L_{it} is the total annual number of permanent and full-time workers. M_{it} is the total annual cost of energy (incl. fuel and natural gas). A_{it} is the TFP term and α, β, γ are the output elasticity of capital, labor and intermediate inputs respectively.⁶

The choice of production factors mainly depends on how crony and non-crony firms differ in productivity levels. Crony firms in Egypt have access to uneven privileges among which subsidized energy is the most appealing. Yet, to ensure the sustainable provision of these privileges and secure its survival, the firm must fulfill to some condition, among which maintaining a certain amount of labor is the most important (to secure votes in main elections and referendums). Hence, crony firms' privileges and excess of labor might directly affect their value of capital comparing to non-crony firms. In addition, we control in our estimation for the probability of survival of firms by including an inverse mills ration. We also cluster our

⁵ The dataset used in this paper is an unbalanced panel that do not report retrospective information on the values of inputs and capital. Only 265 firms have been interviewed repeatedly in the five waves of the survey. Hence, the lack of past information on the value of capital and inputs, as well as the gaps existing between the rounds of the survey unable us to get consistent estimates of total factor productivity (TFP) following Levishon & Petrin (2003) or Akerberg et al. (2015)'s production functions.

⁶ All monetary information are in real terms and reported in Egyptian pounds. Monetary values are deflated using GDP deflators available through the World Bank national accounts data, and OECD National Accounts data files.

standard error by the firm ID to control for firms' heterogeneity across the different years of the survey.

Independent variable of interest: Firms politically connected (FPC)

Unlike most of previous studies on political connection (Fisman, 2001; Faccio, 2006; World Bank, 2014 and Acemoglu et al., 2017), this paper does not use stock market information or face-to-face interviews with managers to identify connected firms for three main reasons. First, stock market information cannot be merged to other firm-level performance indicators. Second, the stock market in Egypt has been completely shut down around the time of the revolution. Third, crony firms after the revolution are mainly connected to the army or military business, which can be hardly identified using stock market information or interviews. We rather base our identification of politically connected firms using a constructive approach from the variables included in our dataset following the main findings of these previous studies.

First of all, we use the World Bank (2014) study on political connection in Egypt that provides a listing of connected firms per 4-digits industry classification, using a total of 647 interviews with firms' manager. Based on this listing we identify connected sectors in our data as those industries with high-energy intensity and high potential growth as shown in table (1). We then compile all available information that might reflect political connectivity as found in previous studies. Any firm reporting the facts (or criteria) listed in table (2) is considered as politically connected. Doing so, out of 8654 formal firms included in our sample, 966 firms are identified as politically connected (representing 11.43% of employment in the sample).⁷

TABLE 1
Connected sectors according to ISIC-2-digit industry classification

ISIC-2-digit main division (Rev. 3.1)	#of firms	Percent
Extraction of crude petroleum and natural gas	2	0.03
Other mining and quarrying	1	0.02
Manufacture of food products and beverages	621	10.24
Manufacture of textiles	1,143	18.85
Manufacture of wearing apparel; dressing and dyeing of fur	1,141	18.81
Manufacture of coke, refined petroleum	4	0.07
Manufacture of chemicals and chemical products	499	8.23
Manufacture of basic metals	166	2.74
Manufacture of machinery and equipment	568	9.37
Manufacture of electrical machinery and apparatus n.e.c	850	14.01

⁷ According to our sample, representative to the formal private sector in Egypt through the period 2004-2016, connected firms represent around 11% of total employment. This ratio is very close to the one reported by the World Bank (2014), where connected firms in 2010 accounted for 7% of total employment.

Manufacture of radio, television and and communication equipment and apparatus	5	0.08
Recycling	7	0.12
Electricity, gas, steam and hot water supply	7	0.12
Construction	246	4.06
Wholesale trade and commission trade, e except of motor vehicles and motorcycles	184	3.03
Retail trade, except of motor vehicles	257	4.24
Water transport	16	0.26
Supporting and auxiliary transport activities	337	5.56
Real estate activities	10	0.16
Other business activities	1	0.02
Total	6,065	100

Notes. This table reports the list of connected sectors according to the ISIC-2-digit code industry classification extracted from the World Bank panel Enterprise Surveys on private formal firms' performance in Egypt.

TABLE 2
Determine politically connected firms

Sector type	Firm size	Criteria	# additional FPC each criteria
Connected sector	Large	Government shares $\geq$ 1%	118
Connected sector	Large	Access to Subsidized land	+5
Connected sector	Large	Access to land from state	+9
Connected sector	Large	% of Energy cost in total sales=0	+82
Connected sector	Large	Largest owner is the government	+11
Connected sector	Large	Number of domestic competitors=0	+38
Connected sector	Large	Waiting time to get the industrial license=0	+160
Connected sector	Large	$\geq$ 50% Wk from state	+9
Connected sector	Large	% of manager time to deal with government regulation=0	+312
Connected sector	Medium	Government shares $\geq$ 50%	+12
Connected sector	Small	Government shares $\geq$ 50%	+5
Connected sector	Medium	Largest owner is the government	+6
Connected sector	Small	Largest owner is the government	+1
Connected sector	Medium	Access to Subsidized land	+7
Connected sector	Medium	Access to land from state	+6
Connected sector	Medium	% of Energy cost in total sales=0	+185
Total			966

Notes. This table explores the criteria based on which we determine firms' politically connected. The criteria in the third column are variables extracted from the World Bank panel Enterprise Surveys on private formal firms' performance in Egypt.

The constructed political connection variable (FPC) identifies firms' political connection status at time (t). This means that a firm could switch in its connection status across the years of the survey (i.e. a firm could be politically connected in 2004 and 2007, but not in 2008 and 2013, and then appear as connected again in 2016) and depending on the number of time this firm has been interviewed (unbalanced panel). Hence, and as a last step, to identify our treatment

group, we divide our sample to pre-and-post revolution periods. We then consider any firm connected during at least one of the years before (or after) the revolution as connected in the pre-revolution period (or post-revolution period).⁸ Accordingly, our treatment group includes all firms whose final status was “politically connected” as resumed in table (3). Moreover, we account for firms’ switch in political connection status (light grey rows) later in our regressions.

TABLE 3
Firms’ transition in political connection status before and after the 2011 revolution

Firms’ status	Firms’ status		FPC =0 control gr. =1 treatment gr.	total
	Pre-revolution 2004–2007-2008	Post-revolution 2013-2016		
Remained connected	Connected	Connected	1	154
Was connected and disappeared	Connected	Not surveyed	1	433
New connected firm entering the market	Not surveyed	Connected	1	514
Became connected	Unconnected	Connected	1	177
Remained unconnected	Unconnected	Unconnected	0	1690
Was unconnected and disappeared	Unconnected	Not surveyed	0	2126
New unconnected firm entering the market	Not surveyed	Unconnected	0	3237
Became unconnected	Connected	Unconnected	0	323
				8654

Notes. Data in this table are extracted from the World Bank panel Enterprise Surveys on private formal firms’ performance in Egypt.

Informal competition and other covariates

As already mentioned, the novelty of this paper consists in testing the impact of cronyism on formal firms’ productivity by accounting for sector-level intensity of informal competition. The WBES measure this last using a discrete variable (IC_{it}) that equals 0 if formal firms do not perceive informal competition as an obstacle; 1 if they perceive it as a minor obstacle; 2 if moderate; 3 if major and 4 if very severe.⁹ As competition is better defined in relevance to the

⁸ For example, a firm is considered connected in the pre-revolution period if this firm has been connected in 2004 and not in 2007 or 2008 (or any different combination). Similarly, a firm is considered connected in the post-revolution period if this firm has been connected in 2013 and not in 2016 (or any different combination).

⁹ WBES measures the competition from informal firms as the establishment’s perception that it may be competing with firms that may be smuggling, not abiding by copyrights or other intellectual property restrictions, avoiding the payment of taxes or duty, producing and/or selling counterfeit items and/or skirting regulations or other measures prescribed by law.

sectors of activity and as informality is more felt on a local level, we use in our model the mean of this variable by ISIC-2-digit code and region ($IC_isic_region_{it}$).

We introduce in our model other firm-level characteristics that could determine formal firms' productivity and probability of being connected such as; firms' size, age, percentage of exports, regional location, access to skilled labor, manager's education level, possession of quality certification, access to loan, perception towards corruption practices and firms' sector of activity.

III. Suggestive evidence from data

This section presents some descriptive evidence on the relationship between political connection in Egypt, formal firms' performance and informal competition in the aftermath of the 2011 Egyptian revolution. Before reviewing these evidences, it is important to explain the reasons we expect that political connection will differently affect firms' productivity in the aftermath the revolution comparing to before, as well as the reasons we expect that this effect will depend on the intensity of informal competition.

In the spirit of Acemoglu et al. (2017)'s paper describing the different phases of the Egypt Arab spring's, we suppose that the Egyptian political system came across four different phases. In the first phase, the political system was trapped into the three decades of Mubarak's dictatorship regime. In the second phase, this system witnessed the 2011 revolution that was directly followed by the fall of the Mubarak regime and a temporary military rule. In its third phase, Mohamed Morsi was elected as the first "islamist" president (June 2012), which was followed by his fall within a year and another military rule (July 2013). In the fourth and final phase, the actual president Abdel Fatah El-Sissi was elected (June 2014). Lets' suppose now the case of a "representative" firm that was politically connected during Mubarak's regime. This firm had access to a set of privileges that were increasing its profitability and value, but deterring competition and growth. This firm was also subject to many obligations depending on politicians' interests (funding electoral campaigns, sustain high employment level, etc.), but was ensuring large economic rents and control in exchange (escape-competition and Schumpeterian effects are dominating during this first phase).

During the second phase, this firm has probably suffered from a large reduction in its value and profitability due to the large economic instability that followed the 2011 revolution and to

the dissolution of the dominating party, parliament and cabinet of ministers that were mostly composed of businesspersons (exogenous-shock-effect is dominating). Arriving to the third phase, this firm has probably been expropriated and replaced by another one, but rather connected to the “Muslim Brotherhood” structure (both Schumpeterian and exogenous-shock effects are prevailing).¹⁰ Finally, in the last phase, our “representative” firm had to switch its loyalty to the new regime in order to regain power. Alternatively, we can also think that our “representative” firm remained under the control of the state and have been replaced (or taken over) by another connected firm, but rather connected to the military system (or the army business). Therefore, nowadays, the Schumpeterian-effect prevails since politically connected privileged firms are replacing incumbent and potentially innovative ones.

Besides, as documented in our first section, the informal sector is another dominant actor in the Egyptian private sector. The survival of this sector is largely attributed to its capacity to draw large cost advantages by escaping taxes and regulation. This allows the actors of this sector to strongly compete against the actors of the formal sector and to take market shares. Moreover, the growing size of the informal sector is one of the inevitable externality of cronyism since the increase of this last diminishes productivity growth and shifts employment to smaller informal activities. In addition, as the size of the informal sector usually expand during conflicts and political instability, the combined effect of existing political connections and informal firms’ competition during the different phases of the Egyptian Arab spring will jeopardize any potential possibility for formal firms to reach the technology frontier.

Political connection and informal competition aftermath the revolution. Table (4) highlights the main changes in firms’ structure and performance indicators before and after the revolution. On average, after the revolution, formal firms’ output is lower, their size and average number of total full-time workers are slightly reduced, and their perception towards the informal competition constraint becomes less binding. Firms’ performance remains almost the same in terms of labor productivity, but is almost halved in term of TFP. This evidence provides first insights on the extent to which all firms in the private formal sector have been largely affected by the economic and political instability in the aftermath of the revolution (3rd and 4th phases).

¹⁰ According to Acemoglu et al., 2017, “islamist” connected firms have always been present in the Egyptian Economic system but indirectly (or hidden) through the creation of charitable networks and religious schools.

Although the average number of connected firms slightly reduced after the revolution, figure (1a) shows the irregular evolution of these last over the years of the survey. The reduction of the number of connected firms started before the revolution, or more precisely after 2007. It went from 13% in 2004 to 18% in 2007, and then reached the 15% in 2008. The reduction in the number of connected firms continued after the revolution and reached its lowest level in 2013. Yet, after this date, the number of connected firms regained its strength and is almost back to its initial level (17% of the sample in 2016 are connected).

Besides, figure (1b) demonstrates the continuing decrease in formal firms' intolerance towards the severity of informal competition since 2008. Combining figures (1a) and (1b), we can notice the causal effect existing between the intensity of cronyism and informal competition. The lower is the intensity of cronyism in a given period (after 2007), the lower will be the intensity of informal competition in the next period and the more tolerant formal firms will be towards the informal competition constraint (since 2008). Therefore, we can expect a decrease in formal firms' tolerance on the longer-term due to the large increase in cronyism in 2016.

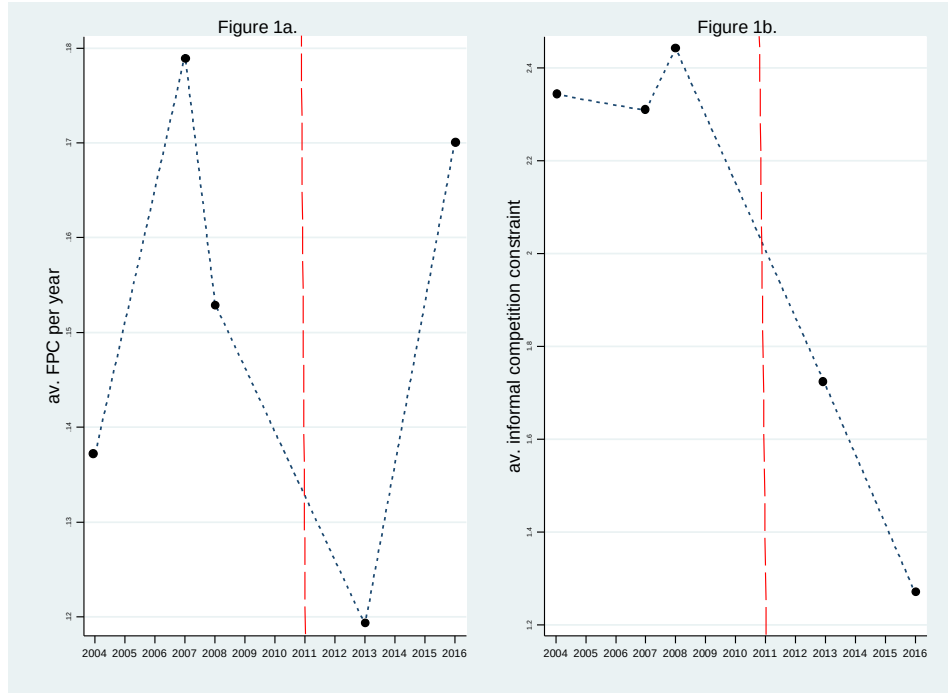
TABLE 4
Formal firms' structure and performance indicators before and after the revolution

	before revolution	After revolution
Output (in real term)	367021	213720
Employment	206	147
Size (1=small/3=large)	1.9	1.8
Informal competition (0=no obstacle/4=very severe obstacle)	2.37	1.5
Labor productivity (in real term)	1002.6	1082.25
Ln(TFP) (in real term)	5.8	2.4
FPC	0.157	0.138

Notes. This table compares formal firms' performance and informal competition before and after the revolution based on the World Bank panel Enterprise Surveys on private formal firms' performance in Egypt

FIGURE 1

Political connection and informal competition throughout the years of the survey



Notes. These figures show the evolution of political connection and informal competition on average through the years of the survey based on the World Bank panel Enterprise Surveys on private formal firms' performance in Egypt.

Connected vs. Unconnected firms. Table (5) below presents the main characteristics of connected firms comparing to unconnected ones. On average, the former are larger in size. They produce three times more and employ three time more workers. Nevertheless, connected firms report lower labor productivity and TFP on average, and are slightly more tolerant to the informal competition constraint. This evidence indicates the extent to which the survival of crony firms mostly depends on their capacity to draw advantages in cost via their access to uneven privileges that secure their value and profits (reflected in higher sales).

The differential in firms' responses in terms of labor productivity and TFP throughout the years of the survey in figure (2) derives more appealing results. It first indicates that, unlike TFP, crony and non-crony firms follow very different trends in terms of labor productivity. It also indicates that most of the reduction in crony-firms' labor productivity was driven by the pre-revolution period. In contrast, most of the reduction in crony firms' TFP was driven by the post-revolution period. Two factors could explain these differences. The first is related to the TFP estimation procedure that account for firms' probability of survival as well as the cost of energy and the capital value. The second is related to the fact that crony firms are relatively less responsive to business cycle fluctuation, especially in terms of employment. As shown in

figure (3), crony-firms' employment distribution is more skewed to the right and reports two different peaks, while non-crony firms' employment distribution is relatively smoother.

Combining firms' productivity, political connection and informal competition throughout the years of the survey in figure (4), we can notice that the intensity of informal competition plays a major role in determining productivity differentials between connected and unconnected firms, before and after the revolution. Regarding TFP measure, crony-firms remain less productive than non-crony firms even with lower intensity of informal competition (figure 4b.). Yet, regarding labor productivity measure, crony firms can in fact outperform non-crony firms with lower intensity of informal competition (except in 2013) (figure 4a.). Nevertheless, with higher intensity of informal competition, crony-firm remain relatively more productive only in the post-revolution period.

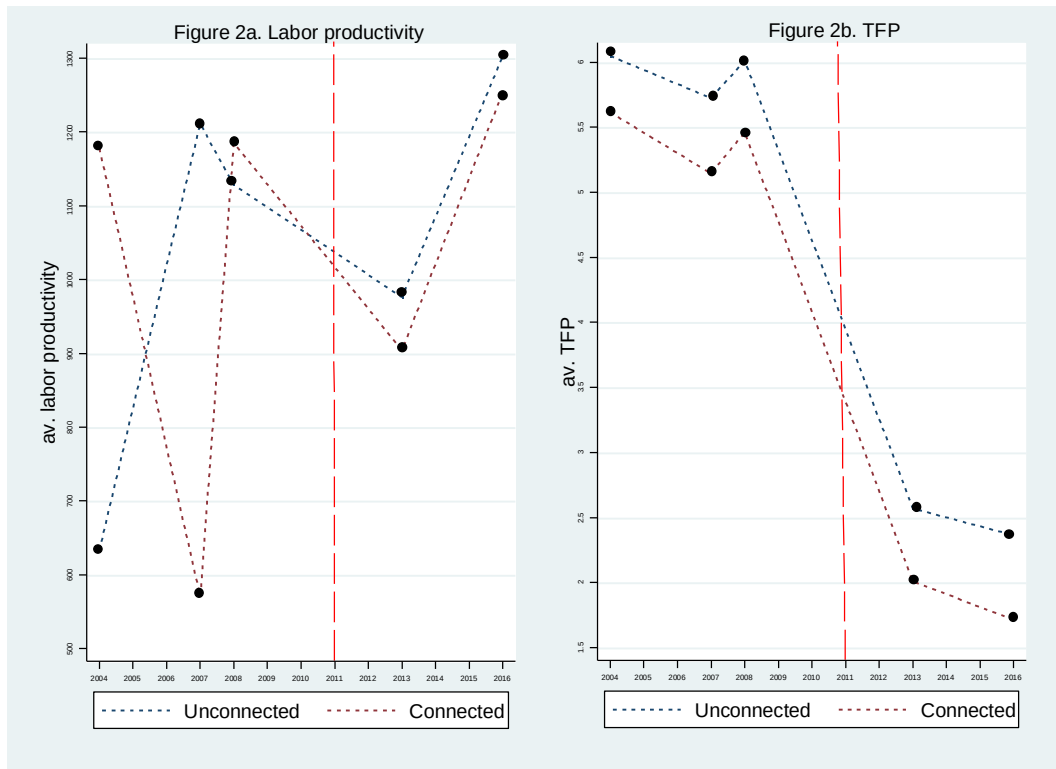
Therefore, the main messages derived from these evidences is that cronyism externalities do not only involve lower competition and productivity, but also higher informal competition (in line with our 2nd hypothesis). Coincidentally, the intensity of this last plays a major role in determining the productivity of crony-firms, which in fact mostly depends on firms' employment. Yet, confirming these key messages remain an empirical question.

TABLE 5
Connected and unconnected firms' main performance indicators

	Unconnected firms	Connected firms
Output (in real term)	216803	677296
Employment	119	494
Size (1=small/3=large)	1.73	2.6
Labor productivity (in real term)	1043	1000
Ln(TFP) (in real term)	4.4	3.97
Informal competition (0=no obstacle/4=very severe obstacle)	1.96	1.87

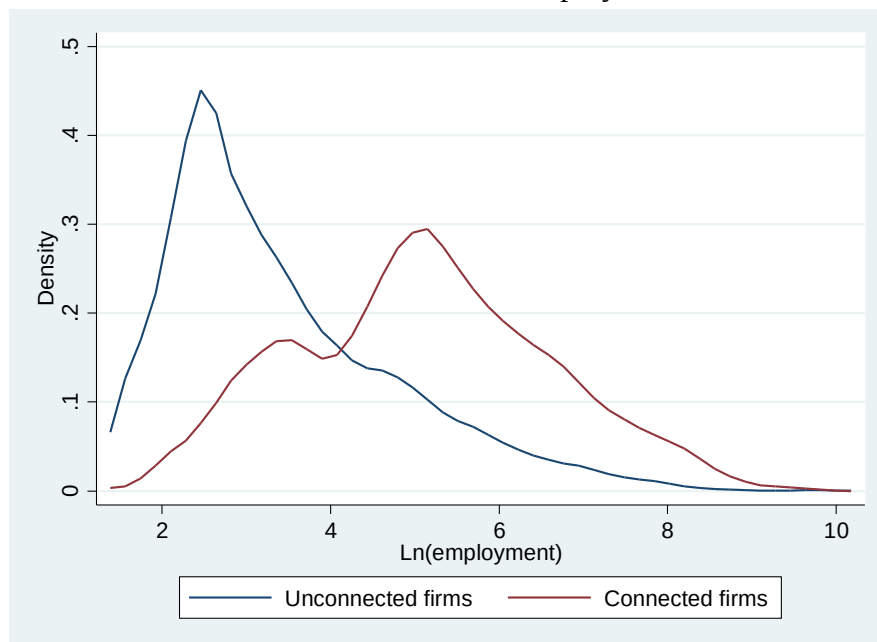
Notes. This table compares connected and unconnected firms in terms of firms' performance indicators and informal competition based on the World Bank panel Enterprise Surveys on private formal firms' performance in Egypt.

FIGURE 2
Firms' political connection and firms' productivity



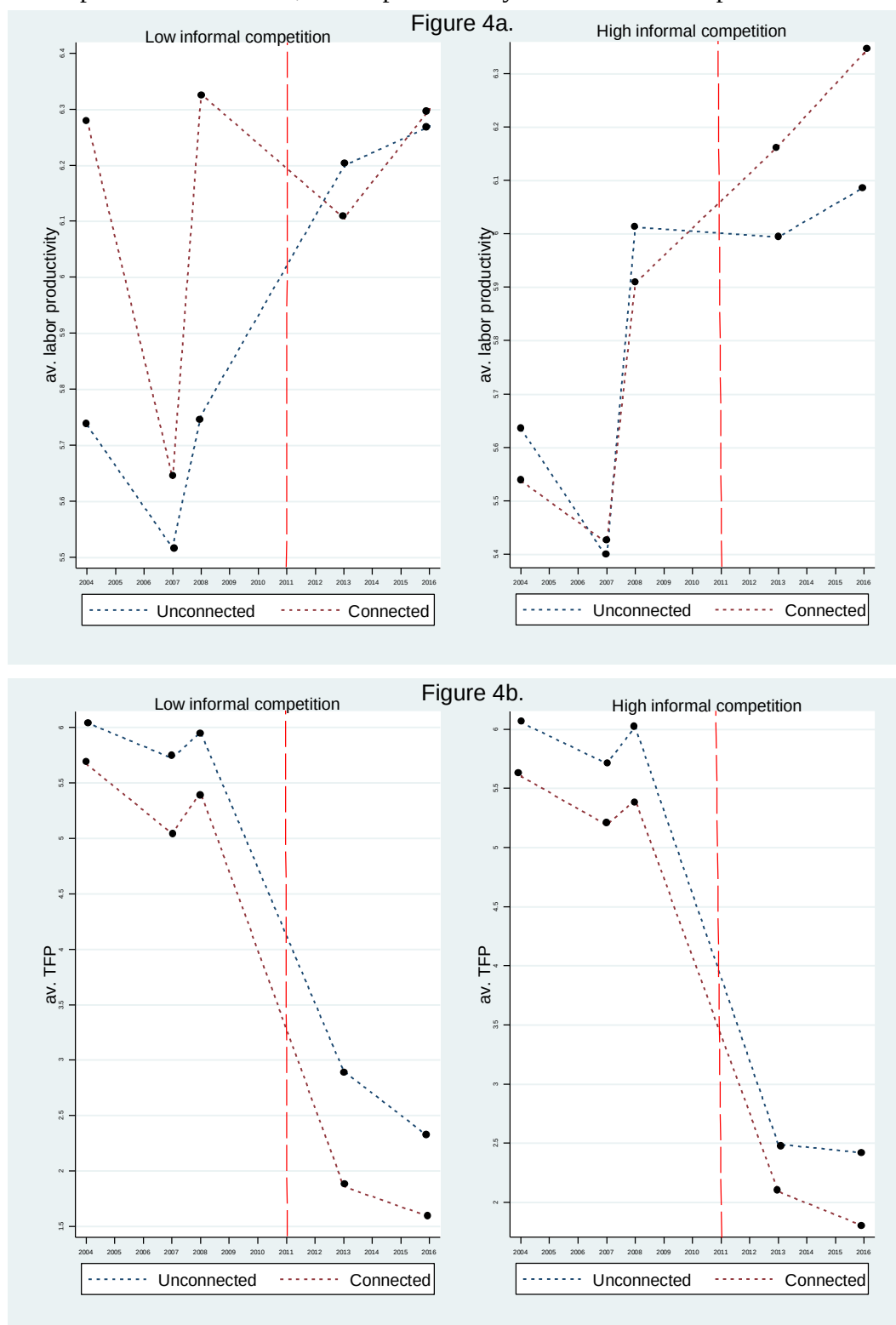
Notes. This figure compares connected and unconnected firms in terms of the evolution of their labor productivity throughout the years of the survey based on the World Bank panel Enterprise Surveys on private formal firms' performance in Egypt.

FIGURE 3
Connected and Unconnected firms' employment distribution



Notes. This figure compare connected and unconnected firms' employment distribution based on the World Bank panel Enterprise Surveys on private formal firms' performance in Egypt.

FIGURE 4
Firms' political connection, firms' productivity and informal competition constraint



Notes. These figures replicate figure 2 according to the level of informal competition constraint. Informal competition is a dummy variable taking the value of 0 for lower intensity ($<\text{mean}$) and the value of 1 for higher intensity ($>\text{mean}$). These figures are drawn based on the World Bank panel Enterprise Surveys on private formal firms' performance in Egypt.

IV. Identification strategy

Our empirical strategy aims to test the impact of political connections on firms' productivity in the aftermath of the revolution comparing to before. As connected firms systematically differ from unconnected ones, a potential self-selection and omitted variable biases may alter the identification of this causal effect. Hence we rely our analysis on a propensity score reweighted estimator combined with a difference in difference estimator (PSM reweighted-DiD) that will enable us to control for unobservable heterogeneity (DID), as well as to remove observable heterogeneity in initial conditions by constructing the counterfactual (reweighted PSM). This methodology has been previously used in several papers in the political economy and institutional literature (Desai & Olofsgård, 2008; K. Mayer, 2011; Brockman et al., 2013).

The PSM-DID approach consists of two stages. In the first stage, the propensity score $[\widehat{\Pr}(FPC = 1|x_{pre-2011})]$ is estimated using a non-linear matching technique on the pre-revolution sample (total of 4015 firms). This first procedure constructs a control group of firms that matches most closely to treated firms (politically connected firms) based on observable characteristics $x_{pre-2011}$. This vector includes covariates that might affect firms' probability of being connected and firms' productivity. Hence, firms in the control group are matched to the treatment group on the basis of the pre-treatment (prior to the 2011 revolution) mean of these variables and the propensity score is estimated based on the following Probit model.

$$FPC_i = \beta_0 + \beta_1 x_{pre-2011} + \varepsilon_i \quad (\text{eq. 3})$$

Where FPC_i is a binary variable taking the value of 1 if the firm is treated (politically connected) as explained in section II (table 3), and 0 otherwise. Vector $x_{pre-2011}$ includes a set of covariates as firms' size, age, percentage of exports, regional location, access to skilled labor, manager's education level, procession of quality certification, access to loan, perception towards corruption practices and firms' sector of activity.

Table (6) reports the results from the estimation of the Probit model. These results identify the main determinants of political connection. The probability of being a politically connected firm mostly increases with the size of the firm (higher employment). It also increases significantly with the age of the firm, the higher education level of its manager, its access to skilled labor, and most interestingly with more severe corruption practices. Yet, higher percentage of firms' exports and access to loan have a negative impact on the probability of being a connected firm.

TABLE 6
Propensity score estimation – Probit regression

	Firms politically connected
Ln(tot. employment)	0.339*** (0.00739)
firm's age	0.00182*** (0.000394)
Direct & indirect export (%sales)	-0.00166*** (0.000110)
Top manager education (ref. primary educ.)	
<i>Not completed secondary school</i>	0.0470** (0.0225)
<i>Secondary school</i>	0.336*** (0.00932)
<i>Vocational training</i>	-0.133* (0.0759)
<i>Some university degree</i>	0.322*** (0.0206)
<i>Post-graduate degree</i>	0.480*** (0.0162)
<i>PhD degree</i>	0.233*** (0.0569)
Quality certification	0.0534 (0.0404)
Access to skilled labor	0.0306*** (0.00709)
Corruption constraint	0.0751*** (0.0229)
Access to loan	-0.0952*** (0.0250)
Constant	-3.986*** (0.0793)
Observations	1,394
Region FE	yes
Year FE	yes
Panel FE	yes
Sector FE	yes
se-cluster	sector

Notes. This table reports coefficients from Probit estimation. The dependent variable denotes firms' probability of being politically connected (FPC) as explained in section II (table 3). List of variables is provided in appendix 1. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

Next and based on the above determinants, a matched control group is constructed to compare with treated firms where matching is based on the kernel function approach. To assess the credibility of the matching procedure, a formal pairwise t-test comparison between the treated and matched control firms is used to see whether there are any significant differences. Table (7) shows the pre-treatment means of the determinants between the treated and matched groups. The p-values from the t-test are sufficiently high across the different covariates, indicating that any systematic differences are removed in the distributions of covariates between the control

and treatment groups.¹¹ Following the common support condition, focus is placed on the matched firms that fall within the support of the propensity score distribution of the treated group.

TABLE 7
Balancing tests for propensity score matching

	Mean		%bias	t-test	
	Treated	Control		t-test	p> t
Ln(tot. employment)	5.0901	4.9962	6.5	0.65	0.513
firm's age	25.558	25.408	0.8	0.08	0.934
Direct & indirect export (%sales)	14.576	14.562	0.1	0.01	0.996
<i>Not completed secondary school</i>	.01653	.01765	-0.7	-0.09	0.924
<i>Secondary school</i>	.02479	.02642	-0.7	-0.11	0.910
<i>Vocational training</i>	.02066	.02081	-0.1	-0.01	0.991
<i>Some university degree</i>	.76446	.76308	0.3	0.04	0.971
<i>Post-graduate degree</i>	.10331	.09678	2.4	0.24	0.811
<i>PhD degree</i>	.06198	.06497	-1.4	-0.13	0.893
Quality certification	.34711	.33893	2.0	0.19	0.850
Access to skilled labor	.5	.5156	-3.1	-0.34	0.732
Corruption constraint	.66116	.68497	-5.0	-0.56	0.578
Access to loan	.19835	.20885	-2.8	-0.29	0.775
Reg. West Delta	.30992	.28315	5.9	0.64	0.520
Reg. Suez	.09504	.10065	-2.0	-0.21	0.836
Reg. Middle & East Delta	.19008	.20569	-4.3	-0.43	0.667
Reg. Northern Upper Egypt	.04132	.03878	1.2	0.14	0.887
Reg. Southern Upper Egypt	.02893	.02755	0.7	0.09	0.928
y. 2007	.39669	.37264	5.3	0.54	0.587
y.2008	.42975	.46517	-7.1	-0.78	0.434
P. 2 times	.34711	.32019	5.9	0.63	0.531
P. 3 times	.28512	.33341	-10.9	-1.15	0.251
P. 4 times	.11983	.1141	1.8	0.20	0.756
P. 5 times	.03719	.03201	3.0	0.31	0.756
Sec. Manufacturing	.95868	.96008	-0.8	-0.08	0.938
Sec. Other	.02066	.01313	6.5	0.64	0.521

Notes. This Table shows mean value of variables for the reweighted sample. Propensity score matching using kernel matching is applied to test whether there is a significant difference between the treated and matched samples on potential determinant of firms' political connection. List of variables is provided in appendix 1.

The propensity score matching provides us with an appropriate foundation to implement the DID estimation. The DID estimator is used to control for all unobservable time-invariant characteristics that may influence firms' productivity as industry-specific and region-specific effects. We start our model by merging all matched firms that fall within the support of the propensity score distribution in the pre-2011 sample to our entire sample. We then focus our analysis on matching firms in order to implement the DID estimation in a weighted regression.

¹¹ The results of the Probit regression and of the balancing test are very similar using labor productivity or TFP as dependent variables.

Using the propensity score, we compute the inverse probability of treatment, which provides a weight equals to $1/Pscore$ for the treatment group and $1/(1 - Pscore)$ for the control group. We then start by estimating the following weighted DiD regression;

$$\ln(y_{it}) = \alpha + \beta T_{i1}t + \delta T_{i1} + \vartheta t + \alpha_f + \gamma_s + \varepsilon_{it} \quad (\text{eq.4})$$

Where, $\ln(y_{it})$ is the firm-level logarithm of labor productivity or TFP. T_{i1} refers to the treatment group ($T=1$), which is firms' political connection (FPC) or firms' transition in crony status. t is a time dummy and refers to the post-revolution period and gets the value of 1 if firms are surveyed after 2011. We control in our regressions for unobserved firms-specific effects that might affect our dependent variable by including firms and sector fixed effects (α_f, γ_s). We also cluster our regressions by firms' sector of activity.

As a second step, and in order to estimate the combined effect of political connection and informal competition, we interact our coefficient of interest in equation 4 (β) with the sector-region-level intensity of informal competition ($IC_isic_region_{it}$), as follows:

$$\ln(y_{it}) = \vartheta + \theta T_{i1} * IC_isic_region_{it} * t + \sigma T_{i1} + \vartheta t + \alpha_f + \varepsilon_{it} \quad (\text{eq. 5})$$

V. Main Results

In this section, we start our analysis by showing the extent to which cronyism affects firms' labor productivity and TFP around the time of the revolution and in the medium-term following the revolution comparing to the pre-revolution period (table 8). We proceed the analysis by estimating the change in this underlined effect when accounting for crony firms' responses towards the increasing intensity of sector-regional-level informal competition (table 8). We then focus our analysis on the sub-sample of firms that switch in their crony status before and after the revolution and compare them to firms that remain unconnected (table 9). We end this section by presenting the main channel through which our main estimated effects occur (table 10).

As described in section IV, our analysis is based on propensity score matching and reweighting combined with a difference-in-difference estimator. In the following DiD regressions, we disentangle between the 2013 and 2016 post-revolution average treatment effects. We do so in order to show the longer-term effects, as well as to account for the potential biases of the 2013

estimated results, arising due to the large economic and political instability that happened during this period (second and third post-revolution phases as described in section III).

The main effect: Post-revolution cronyism and informal competition

Table (8) reports the average treatment effect of post-revolution cronyism on firm's labor productivity (column 1) and TFP (column 3). Being a "connected" firm reduces significantly the firms' labor productivity and TFP in 2013 comparing to before. Yet, this negative impact completely disappears and turns significantly positive in 2016, especially in terms of labor productivity. Hence, on five years after the revolution, a crony firm experiences significant and high increases in its labor productivity and TFP that may reach 141% and 27% respectively, comparing to before. Nevertheless, we cannot conclude with confidence that politically connected firms after the revolution are more productive than unconnected ones. This longer-term positive effect is probably unsustainable because of the large misallocation of resources into the economy. In other words, politically connected firms' advantage in cost allow them to reduce domestic competition and to outperform and replace incumbent firms. This effect might translate into more entry into the informal sector, which increases informal competition and alters crony firms' performance.

In order to derive a more explicit conclusion, we interact our coefficient of interest with the sector-regional intensity of informal competition. This interaction shows how crony firms react to the increased intensity of informal competition in a given sector and region in Egypt in the post-revolution period comparing to before. Unlike the initial positive estimated effect, table (8) columns (2 & 4) report a significant negative impact of this interaction on firms' labor productivity and TFP in 2013 comparing to before. Regarding the 2016 effect, this negative impact remains significant and stronger in terms of labor productivity but loses its significance in terms of TFP. Therefore, the increasing intensity of informal competition in a given region and sector of activity after the revolution can totally offset the positive impact that cronyism might have on firms' labor productivity and TFP.

Moreover, figures (5) confirm that the negative impact of cronyism coupled with increasing informal competition also holds at different intensity levels of informal competition. Based on the percentiles of our variable "sector-regional informal competition", we consider four different intensity levels; very low (less than 5th percentile), low (between 5th and 50th percentile), moderate (between 50th and 95 percentile) and high (more than 95th percentile).

The estimated coefficients prove that even very low intensity of informal competition will drive cronyism to have a significant negative impact firms' labor productivity and TFP, and will totally offset and outweigh any potential positive impact (table 8, columns 1 & 3).

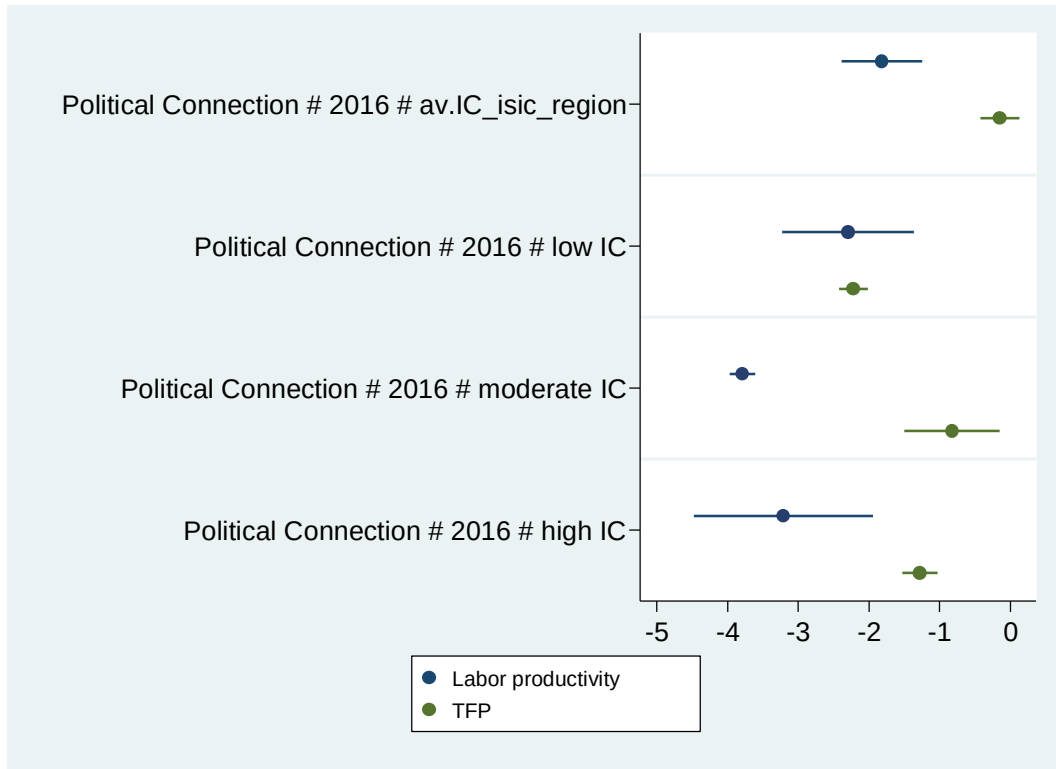
These first results are in line and complement the existing literature on cronyism (Fisman, 2001; Faccio, 2006). Cronyism not only increase the value of the firm but can also increase its productivity. Yet, this reported increase in productivity is totally neutralized if we account for crony firms' externalities. Crony firms (through their access to uneven privileges) create a misallocation of resources that leads to the reduction of domestic competition and incentives to innovate by incumbent firms. These last might decide to exit the market, which might translate into more entry into the informal sector and increase in the intensity of informal competition. This can in turn totally jeopardized any positive impact of cronyism on firms' productivity.

TABLE 8
Post-revolution cronyism, informal competition and firms' productivity

	Ln(labor productivity)		Ln(TFP)	
	(1)	(2)	(3)	(4)
Political connection # 2013	-0.347*** (0.030)		-1.652*** (0.016)	
Political connection # 2016	1.418*** (0.025)		0.273*** (0.014)	
Political connection # 2013 # av.IC_isic_region		-0.546** (0.125)		-0.167* (0.064)
Political connection # 2016 # av.IC_isic_region		-1.819*** (0.204)		-0.149 (0.099)
Constant	5.640*** (0.157)	6.446*** (0.415)	5.634*** (0.080)	6.395*** (0.327)
Observation	3058	3057	2773	2772
R-squared	0.566	0.585	0.660	0.664
Sector FE	yes	no	yes	no
Firm FE	yes	yes	yes	yes
se-cluster	Sector	Sector	Sector	Sector

Notes. Table shows estimates from the ATT based on reweighted regressions at the firm-level. The dependent variable in columns (1 & 2) is the logarithm of firm-level labor productivity (in real terms), and in columns (3 & 4) is the logarithm of firm-level total factor productivity (TFP, in real terms). List of variables is provided in appendix 1. Clustered standard errors at the sector-level are reported between brackets in all columns. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

Figure 5
Post-revolution cronyism, informal competition and firms' productivity



Notes. These figures report the estimated effect of political connections combined with informal competition on the logarithm of firm-level labor productivity (in blue) and TFP (in green). The interaction “Political connection#2016#av.IC_isic_region” refers to the results reported in table (8) columns (2 & 4). We consider in this graph different intensities of the variable regional-sector level informal competition; very low (less than 5th percentile) (the reference category), low (between 5th and 50th percentile), moderate (between 50th and 95 percentile) and high (more than 95th percentile). Reported coefficients are statistically significant at the 1% level (except for the TFP coefficient of political connection#2016#av.IC_isic_region)

The sub-sample effect: Firms' switch in crony status

Table 9 focuses on the sub sample of panel firms that were surveyed before and after the revolution in order to explicitly show how firms' shift in connectivity status could affect their productivity in the post-revolution period comparing to before. Hence, our variable of interest compares firms that remain unconnected after the revolution (reference category) to three different status; firms that remain connected after the revolution “remain connected”, firms that were unconnected before the revolution and became connected after the revolution “became connected”, and firms that were connected before the revolution and became unconnected after the revolution “became unconnected”.

The results reported in table (9) derive ambiguous effects in that matter. Yet, if we focus our analysis on the longer-term effects, we notice that “became connected” firms are the only ones that significantly and highly gain in terms of labor productivity as well as in terms of TFP,

comparing to “remain unconnected” firms. Nevertheless, if we consider sector-regional intensity levels of informal competition, “became connected” firms will be the ones who actually lose the most in terms of labor productivity or TFP. This result is very similar to our main effect reported in table (8). However, the response of “remain connected” and “became unconnected” do not significantly differs from that of “remain unconnected” firms. Hence, the long-term negative impact that cronyism has on firms’ productivity, when considering increasing informal competition, is mainly driven by those new connected firms after the revolution; “became connected firms”. This result allows us to say that new crony firms after the revolution can expect some increase in their productivity due to the large provided privileges. Nevertheless, this increase cannot persist unless they escape their own externalities.

TABLE 9
Firm switch in crony status, informal competition and firms’ productivity

	Ln (labor productivity) (1)	Ln(TFP) (2)
Firms’ switch (ref. remain unconnected)		
<i>Remain connected#2013#av.IC_isic_region</i>	3.646*** (0.487)	2.129** (0.546)
<i>Remain connected#2016#av.IC_isic_region</i>	0.202 (0.139)	-0.203 (0.208)
<i>Became connected#2013#av.IC_isic_region</i>	-0.426*** (0.029)	-0.415*** (0.054)
<i>Became connected#2016#av.IC_isic_region</i>	-1.482*** (0.068)	-0.243*** (0.019)
<i>Became unconnected#2013#av.IC_isic_region</i>	0.724* (0.265)	2.015*** (0.227)
<i>Became unconnected#2016#av.IC_isic_region</i>	-0.031 (0.067)	1.964 (1.687)
Constant	7.421*** (0.290)	6.570*** (0.343)
Observation	1339	1198
R-squared	0.579	0.724
Sector FE	yes	yes
Firm FE	yes	yes
se-cluster	Sector	Sector

Notes. Table shows estimates from the ATT based on reweighted regressions at the firm-level. The dependent variable in column (1) is the logarithm of firm-level labor productivity (in real terms), and in column (2) is the logarithm of firm-level total TFP (in real terms). List of variables is provided in appendix 1. Clustered standard errors at the sector-level are reported between brackets in all columns. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

The channel: Crony firms' employment and output

Our results suggest that the access of crony firms to large uneven privileges in Egypt is the main driven of their productivity increase rather than their ability to innovate or to induce competition. This increase is completely offset once we account for crony firms externalities and for one of the main characteristic of the Egyptian market; the large informal sector inducing strong informal competition.

We argue that firms' total employment is the main channel through which a firm could have access to the underlined uneven privileges inducing productivity upgrades. Employment is as well the main channel through which this crony firm could engender externalities. From the one hand, one of the main survival condition of a crony firm is to maintain a certain level of employment, even if it might exceed its needs or capacity, and especially near elections or referendums. That is why crony firms do not respond similarly to the fluctuation of employment in the economy as non-crony firms, and their employment distribution is very different (figure 3). From the other hand, crony firms' externalities mainly happen through employment as their existence in a given sector decreases the incentives to innovate and to compete, which induces incumbent firms to exit the market, and shifts employment to the informal sector. The results reported in table (10) provide us with precise empirical findings in that matter.

Table (10), columns (1 & 3), indicate that firms' employment and sales highly and significantly increase with political connection after the revolution comparing to before. Also, the reported increase in firms' sales is more important than that of employment, which explain the positive effect that long-term post-revolution cronyism has on firms' productivity in table (8, columns 1 & 3). Nevertheless, this effect change when we account for informal competition intensity in a given sector and region. Columns (2 & 4) show that 5 years after the revolution, employment decreases significantly by 15% and sales is no longer significantly affected. Hence, crony firms' externalities jeopardize their ability to maintain the excess of labor, which translates into large disequilibrium bringing down their own productivity. This disequilibrium also explain why "became connected" firms are the one that suffer the most comparing to "remain unconnected" firms.

TABLE 10
Post-revolution cronyism, informal competition and firms' employment and sales

	Ln(employment)		Ln(total sales)	
	(1)	(2)	(3)	(4)
Political connection # 2013	0.993*** (0.050)		1.139*** (0.145)	
Political connection # 2016	1.084*** (0.016)		1.591*** (0.108)	
Political connection # 2013 # av.IC_isic_region		0.113** (0.037)		0.519 (0.292)
Political connection # 2016 # av.IC_isic_region		-0.152*** (0.038)		-0.167 (0.435)
Constant	4.278*** (0.285)	4.776*** (0.305)	15.287*** (0.283)	16.152*** (0.516)
Observation	3983	3982	3459	3458
R-squared	0.751	0.751	0.670	0.671
Sector FE	yes	no	yes	no
Firm FE	yes	yes	yes	yes
se-cluster	Sector	Sector	Sector	Sector

Notes. Table shows estimates from the ATT based on reweighted regressions at the firm-level. The dependent variable in columns (1 & 2) is the logarithm of firm-level total employment, and in column (2) is the logarithm of firm-level total annual sales (in real terms). List of variables is provided in appendix 1. Clustered standard errors at the sector-level are reported between brackets in all columns. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

Taking all together

The survival of crony firms in Egypt depends on their ability to access a certain set of privileges (i.e. subsidized land and energy cost). The sustain provision of these privileges is conditional on certain factors, among which employment is the most important. This is mainly because higher employment reflects a secured amount of targeted votes during main elections and referendums, which in turn reflects the loyalty of the firm to the regime in place.

Firms' access to these privileges allows for higher production, profitability and value (as confirmed in previous studies (Fisman, 2001; Faccio, 2006; World Bank, 2014; Diwan et al. 2016; Acemoglu et al., 2017), but also could translates into higher productivity levels (both in terms of labor productivity and in terms of TFP, as shown in our results). Yet, taking into account crony firms' externalities and the reality of the Egyptian market after the revolution show that this increase in productivity is unsustainable.

From one hand, cronyism diminishes the incentives to innovate and competition in the market, which pushes incumbent firms to exit the market and feed the informal sector. This misallocation of resources engenders a stronger intensity of informal competition, which jeopardizes any increase in productivity and creates a large disequilibrium at the firm level. The crony firm becomes no longer able to maintain the excess in labor and its survival becomes insecure. From the other hand, the set of economic reforms implemented by the government since 2014 (i.e. approval of the VAT Law, reduction of energy subsidies, and the floatation of the Egyptian Pound) caused higher inflation rates and lower welfare, which paved the way for a stronger, larger and more resilient informal sector.

VI. Conclusion

This paper investigates the role of informal firms' competition in determining the micro-level effect of cronyism on formal-firms' productivity in the aftermath of the 2011 Egyptian revolution. Based on the World Bank panel Enterprise Surveys, we follow a constructive approach to indicate politically connected firms based on the findings of the previous literature. Our empirical estimation is use a propensity score reweighting - difference-in-difference estimator that control for self-selection and omitted variable bias, and allows the comparaisn between the post and pre-revolution results.

Our results are in line and complement the existing literature on cronyism (Fisman, 2001; Faccio, 2006). Cronyism not only increase the value of the firm but can also increase its productivity. Yet, this reported increase in productivity is totally neutralized if we account for crony firms' externalities. Crony firms (through their access to uneven privileges) create a misallocation of resources that leads to the reduction of domestic competition and incentives to innovate by incumbent firms. These last might decide to exit the market, which might translate into more entry into the informal sector and increase in the intensity of informal competition. This can in turn totally jeopardized any positive impact of cronyism on firms' productivity. We also provide evidence that crony firms' excess in labor is the main channel through which this effect occurs. Hence, crony firm survival in Egypt depends on their ability to balance between the sustain provision of privileges and the threats imposed by the growth of the informal sector.

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Appendix

Appendix 1: definition of main variables (summary statistics on the full sample)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Firms' annual output	7,346	2.36e+07	7.22e+07	16000	7.50e+08
Firms' annual total workers	8,591	174.9385	633.3684	5	21000
Firms' labor productivity	5,920	1036.001	9500.233	-288770	252442.8
Firms' ln(TFP)	5,012	4.337147	2.374415	-4.942551	13.67272
Firms Politically connected (FPC)	8,654	.1476774	.3548004	0	1
Firm has a loan or credit: dummy variable, equals 1 if firms has a loan or line of credit and 0 otherwise	8,193	.1398755	.346879	0	1
firms' age: the difference between the interview's date and the date on which the firm began operation	8,509	21.68692	17.00684	0	211
Informal competition over ISIC and region: mean of informal competition constraint over ISIC 2-digit- industry codes and regions	8,548	1.929736	.4946295	0	4
Firms direct and indirect exports (%sales)	8,597	8.690508	22.36721	0	100
Firm has a quality certification	8,455	.209107	.406695	0	1
Firm has access to skilled labor	8,555	.3867914	.4870437	0	1
Firms perception towards corruption practices	8,501	.7212093	.4484307	0	1
Informal competition constraint: firms perceptions towards informal competition	7413	No obstacle= 32.89% Minor obstacle= 8.94% Moderate obstacle=15.24% Major obstacle= 15.93% Very severe obstacle= 26.99%			
Firms' size	8591	Small=40.3% Medium= 33.1% Large= 26.6%			
Top manager education level	8642	Incomplete primary school= 0.87% Primary education= 2.74% Did not complete secondary school= 2.87 Secondary school= 3.9% Vocational training= 3.16% Completed secondary school including Vocational= 7.72% Some university degree= 31% Post graduate degree (univ. degree)= 46.33% Ph.D degree= 1.41%			
Sector of activity	8654	Agriculture, hunting & forestry= 0.55% Mining & quarrying= 0.03% Manufacturing= 81.95% Electricity, gas & water supply= 0.08% Construction= 2.84% Wholesale & retail trade= 6.09% Hotels & restaurants= 2.75% Transport, storage & communication= 4.52% Real estate, renting & business activities= 0.9%			

		Other= 0.28%
Survey year	8654	2004= 11.29% 2007= 15.47% 2008=19.63% 2013=32.97% 2016=20.64%
Regions	8539	Greater Cairo= 44.91% West Delta= 15.95% Suez region= 8.53% Middle & East Delta= 17.84% Northern Upper Egypt= 4.42% Southern Upper Egypt= 6.71% Frontier= 1.65%
Panel: number of times firms have been interviewed	8654	1 time= 42.84% 2 times= 24.87% 3 times= 18.1% 4 times= 11.14% 5 times= 3.06%

Notes. This table presents the list of variables included in our regressions. Summary statistics are computed on the full sample based on the World Bank panel Enterprise Surveys on private formal firms' performance in Egypt.