Towards a better integration of the informal sector : three empirical essays on the interaction between formal and informal firms in Egypt and beyond

Nesma Ali Mohamed Ali

UNIVERSITÉ PARIS-EST
ÉCOLE DOCTORALE OMI- ORGANISATION, MARCHÉS, INSTITUTIONS
UNITÉ DE RECHERCHE ERUDITE - ÉQUIPE DE RECHERCHE SUR L'UTILISATION DES DONNÉES INDIVIDUELLES TEMPORELLES EN ÉCONOMIE (EA 437)
SPÉCIALITÉ DOCTORALE SCIENCES ÉCONOMIQUES

THÈSE

Pour obtenir le grade de
DOCTEUR EN SCIENCES ÉCONOMIQUES
DE L'UNIVERSITÉ PARIS-EST

Présentée et soutenue publiquement par :

NESMA ALI

Sous le titre :

Towards a better integration of the informal sector: Three empirical essays on the interaction between formal and informal firms in Egypt and beyond

Directeurs de thèse

Manon DOMINGUES DOS SANTOS
Boris NAJMAN

Membres du Jury

Philippe GAGNEPAIN	Professeur, Université Paris 1 Panthéon-Sorbonne (Rapporteur)
Abbi MAMO KEDIR	Maître de Conférences, HDR, Université de Leicester (Rapporteur)
Ishac DIWAN	Professeur, Harvard Kennedy School et École d'Économie de Paris (Examinateur)
Ferhat MIHOUBI	Professeur, Université Paris-Est (Examinateur)
Racha RAMADAN	Maître de Conférences, HDR, Université du Caire (Examinatrice)
Manon DOMINGUES DOS SANTOS	Professeur, Université Paris-Est (Directrice de thèse)
Boris NAJMAN	Maître de Conférences, Université Paris-Est (Directeur de thèse)

Soutenance le :
03/07/2017

L'université Paris-Est n'entend donner aucune approbation ni improbation aux opinions émises dans les thèses, ces opinions doivent être considérées comme propre à leurs auteurs.

To my beloved country Egypt

To my Mum, Dad, Mostafa and Noha

Acknowledgment

Acquiring a PHD degree has always been one of my biggest dreams. When I first started the program I was full of hope and happiness that I will finally get the degree that will enable me to help the community to which I belong. However, the process wasn't easy at all. Getting a PHD degree is more than a full time job that requires full dedication, strong autonomy, lots of patience and confidence. This very challenging process allowed me to gain a strong experience on the academic, the professional, and most particularly on the personal level. My personal ambition was not the only factor pushing me to continue and "survive". The support that I received from my supervisors, my family, my friends and my colleagues was actually the main factor. And today I have to say that this thesis couldn't be done without your precious support! I do owe you a lot!

I would like to start by thanking God who makes me believe that everything happens for a reason. I would then like to express my deep and sincere gratitude to my family for their continuous and unparalleled love, help and support. I am forever indebted to my parents for giving me the opportunities and experiences that have made me who I am (I love you mum and dad!). I would especially like to thank my mother who selflessly encouraged me to explore new directions in life and seek my own destiny. I am grateful to my sister and my brother for always being there for me (Noha and Mostafa, you are my backbone!). My deepest love and appreciation go to my lovely husband who suffered a lot from my craziness and my ups and downs (Karim, I will always love you!). My deepest unconditional love goes to my lovely little crazy nephew (Adam, you are the best creature on earth!). It is also a pleasure to thank Mohamed, Daria, Rayan who were an important part of this journey, as well as my cousins (Soha, Ahmed, Bassem) and my aunt (Elham) for their sincere prayers. I will be forever grateful for the help, support and patience of my best friends who I consider as part of my family (Dina, Fatma, Rim, Hussein and Moataz thank you for always being there!). This journey would not have been possible without their presence, and I dedicate this achievement to them.

I would like to express my deepest gratitude to my PHD supervisor Boris Najman. I had the pleasure to be one of your students and to co-write papers with you. You were remarkably generous in guiding, advising and supporting me. You never hesitated to show me how much you are proud of me and my work, which helped me a lot in believing in myself and succeeding. I will always be grateful for the effort you have done to make me achieve my PHD in the best possible way. I would also like to extend my sincere appreciation to my co-director Racha Ramadan who never hesitate to offer me help and support. You were a great advisor and a special friend.

I am also grateful to my reading committee members; Prof. Philippe Gagnepain, Prof. Ishac Diwan, Prof. Ferhat Mihoubi, Dr. Abbi Mamo Kedir and Prof. Manon Domingues Dos Santos. I would like to acknowledge with gratitude the following people for helpful discussions and comments: Prof. Philippe Adair, Prof. Jean-Bernard Chatelain, Prof. Amirah El-Haddad, Prof. Hadi Salehi Esfahani, Florian Léon, Caroline Krafft and Emmanuelle Lavallée. I am particularly indebted to Prof. Colin C Williams and Ioana Horodnic. I would also like to thank my University (Paris-Est), my research unit (OMI - ERUDITE) and all my fellow colleagues.

I gratefully acknowledge the funding received towards my PhD from the CEPREMAP. I would like to thank Eleni Iliopulos, Thomas Brand, Thomas Weitzenblum, Benjamin Carton, Francois Langot, Stephan Adjemian and Houtan Bastani. I would like to include a special note of thanks to Erica Perego, Salimeh Monirijavid and Alejandro Buesa who were a unique source of inspiration and a special added value to my journey. I am very happy that I had the chance to share this journey with all of you.

I would like to convey my gratefulness to the French department of the Faculty of Economics and Political Sciences at Cairo University and more particularly to Mona Amer who gave me the opportunity to start this journey. I would also like to express my sincere appreciation to Davis University of California, and more particularly to Stephen Vosti who inspired me to work on that subject and to gain a more practical professional experience in the field.

I will be forever thankful to Riham, Aya for their help, motivation and support (girls, you never failed me!). I would also like to thank my lovely friends in Egypt, France, Switzerland, etc., who always inspire and encourage me despite of the distance (Rana, Isso, Nihal, Noha, Yosra, Mostafa, Ibro, Jala, Boussy, Nancy, Nourhan Hussein, Heba, Shisha, Anna, Gosia & Shaimaa). I would like to give a special thanks to the crazy Egyptian community in Paris who managed to always put a smile on my face (Many thanks to Mayada, Barouni, Raafat, Soad, Omar, Yasmin Saleh, & Gelgel).

A special dedication goes to my lovely country: Egypt. I will always be proud to be a part of this country and I hope that one day I will take part of its development. Also, lots of love go to my second and third home countries; Geneva and Paris in which I made lots of good memories and souvenirs that marked my life.

Finally, this journey would have never been possible without your presence. I will be forever grateful!

Mille Merci!
Nesma Ali

Table of Contents

List of tables and figures

General introduction

Chapter (1)

Chapter (2)

Chapter (3)

General introduction

> *"Often people fail to realise the extent of economically efficient production in the informal sector because of the low incomes received by most workers in the sector. A common interpretation of the cause of these low incomes (in comparison to average wage levels in the formal sector) has been to presume that the problem lies within the informal sector; that it is stagnant, non-dynamic, and a net for the unemployed and for the thinly veiled idleness into which those who cannot find formal wage jobs must fall. It is hardly surprising that this view should be widespread, for academic analysts have often encouraged and fostered such an interpretation."* (ILO, 1972, p.5)

Since its launching in 1972, the concept of the informal sector was initially developed with a very optimistic view (ILO, 1972; Bangasser, 2000). It was considered as an efficient productive sector that will help the official formal economy in developing economies to grow by exploiting idled resources (De Soto, 1990). With the incredible expansion and persistence of the informal sector, this positive view started to fade for many reasons. Moreover, in developing countries the situation is more dramatic because market and institutional imperfections are exacerbated by the severity of corruption, inequality, poverty and unemployment. This context paved the way for the informal sector to be considered as the first shelter and source of income for poor, unemployed and underemployed. Therefore, academics tended to widespread the negative view of the informal sector by considering it as the first opponent to growth and decent jobs, and the source of unfair competition. That's why the informal sector started to be characterised as the shadow economy, the grey economy or the unregulated economy.

Today, the study of the informal sector is becoming crucial in addressing new development policies and economic prospects because of its large contribution in the world's Gross Domestic product (GDP). According to Schneider et *al.* (2010)'s estimates, the weighted average size of the informal economy accounts for 37.6% of official GDP in Sub-Saharan Africa, 36.4% in Europe and Central Asia, 34.7% in Latin America and the Caribbean, and 27.3% in the MENA region (appendix 1, table 1.1). In addition, the average informal employment in total non-agricultural employment continues to grow very fast especially in African countries that report an increase in average informal employment of 50 percentage points between 1985-89 and 2000-07 (appendix 1, table 1.2).

Nevertheless, the growth of the informal sector did not prevent underlined economies to achieve higher economic growth, especially African economies. For example, figure 1.1 (in appendix 1)

shows that, comparing to south and east Asia and Latin America, the trends of the average annual GDP per capita growth in North Africa and Sub-Saharan Africa follow an irregular path that started to stabilize at the beginning of the 90s. However, informal employment (in % of non-agricultural employment) follows a regular path that continues to grow regardless the level of growth attained. Hence, economic growth does not necessarily lead to lower informality growth. Therefore, in order to underline the dilemma created by the informal sector we choose to focalize our analysis on the Egyptian economy as an example of North African countries in which, between 1999 and 2007, the average annual percentage of GDP growth attained 4.78%, while the average percentage of informal economy attained 34.9% of official GDP. We then extend our analysis to include a group of low-income Sub-Saharan African economies in which, between 1999 and 2007, the average annual percentage of GDP growth for the period 1999-2007 attained 4.3%, while the average percentage of informal economy attained 43.5% of official GDP.

More precisely, Egypt is considered as the largest country in North Africa and appears among the most attractive investment destination. However, the Egyptian business environment is a breeding ground for the growth of informality. The shares of total unemployment, particularly youth unemployment, are very large (13.2% of total labour force and 34.3% of total labour force aged 15-24 in 2013), and poverty rates remain very challenging (25.2% of total population in 2010). That's why, comparing to other MENA countries, Egypt is ranked among the highest in the contribution of the informal economy in official GDP (34.9% between 1999-2007), as well as in the share of informal employment in total non-agricultural activities (49.6% in 2012). In addition, micro and small enterprises (M/SEs) are considered as the core of the economic system. They represent 99% of all establishment in Egypt, 85% of non-agricultural private sector employment, and 40% of total employment opportunities (Nasr, 2010). However, 80% of M/SEs in Egypt operate informally which could have serious negative impacts on the Egyptian economy (El-Mahdi, 2006 & 2010; Elbadawi & Loayza, 2008).

Similarly, Sub-Saharan African countries comprise the largest shares of informal economy comparing to all other regions in the world. The size of its informal sector sometimes encompasses that of the formal sector, especially in low-income countries, like in Tanzania and Zimbabwe. These low-income countries also report very high shares of informal employment that sometimes go beyond 70% (as in Madagascar, Mali, Uganda and the Democratic Republic of Congo). Moreover, as shown in appendix (2, table 2.1), the informal sector's controversy is accentuated in

this region. Some countries report simultaneously high GDP growth with large shares of informal economy and informal employment (such as in Tanzania, Ethiopia, and Rwanda).[1]

According to this ironic picture two questions prevail. *Why does the informal sector continue to grow and persist despite its negative impacts? And why doesn't it disappear with economic development?* These questions challenged La Porta & Shleifer (2008 & 2014), Maloney (2004) and Jütting (2009) to rethink De Soto (1990)'s arguments, by revisiting the informal sector and its interaction with economic development. These questions also encouraged more recent researchers to look at the potential positive outcomes that informality could generate, as done by Webb et *al.* (2009 & 2013), Chen (2012), Godfrey (2015), Williams at *al.* (2016), and Amor-s et *al.* (2016).

Based on these last studies, this thesis advances the idea that in Egypt and low-income Sub-Sharan African countries, the informal sector can no more be considered as an isolated inefficient sector that will disappear with economic development. Hence, besides the above prevailing questions, our thesis tries to emphasize the interactions between the formal and the informal sectors in order to identify the channel through which the informal sector could be considered as a driver of economic growth rather than a threat to developing economies. To do so, the chapters constituting this thesis explore answers to the following questions.

- *To what extent does informality affect the productivity of Micro and small enterprises?* (chapter 1)
  Based on the theoretical approaches of Lewis (1954), Harris & Todaro (1970) and Singer (1970), we start by reviewing the negative impact that informality could have on the productivity of M/SEs that are considered as the core of the economic system in Egypt. We also identify the main reasons behind informality and we determine the best mechanism to formalize.
- *Could the interaction between formal and informal firms bring positive outcomes to the economy? Could informal firms become entrepreneurial by competing against formal ones?* (chapters 2 & 3)
  Based on the theoretical approaches of De Soto (1990), Moser (1978), Castells & Portes (1989), we look into the relationship between the formal and informal sector and its interaction with economic development, as a way to understand the persistence of this sector. We put forward our main idea by testing the effect of competition stemming from informal firms on the productivity of formal ones in Egypt and Sub-Saharan Africa.

[1] For a global view of the characteristics of the countries included in our analyses, refer to appendix (2).

- *To what extent do poor business environment and institutional imperfections hinder firms' growth and the formalization process?* (chapters 1, 2 & 3)

  Through our analyses, we underline the effect of taxation and regulation on the strength of competition between formal and informal firms. We also identify firms' access to sources of finance, infrastructure and trainings as the main tools inducing the formalization process and fostering economic growth.

The dilemma raised by the informal sector is also due to the lack of a single common definition of that sector. Despite the international statistical definition of the informal sector and informal employment adopted by the ILO in 1993 and 2003, the categorization of informal workers and units remains very heterogeneous across countries and across researchers.[2] Informality could be identified on the level of economic units or on the level of workers. It could also be identified according to a mixture of quantitative and qualitative criteria like the size of the production unit, the amount of capital invested, the status of activity (registered or unregistered), and the workers' access to social coverage. There is also a lack of a single ideal methodology to measure the size of the informal sector (Schneider & Buehn, 2016). Some researchers use the indirect measure based on the currency demand method, the electricity consumption method or/and the multiple indicators model (e.g. Schneider & Enste, 2000; Kaufmann & Kaliberda, 1996; etc.), while others use the direct measure based on surveys that provide more interesting results (as done by Böhme & Thiele, 2012; McKenzie & Sakho, 2010; etc.).

In fact, recent studies about the informal sector call on the importance of applying new empirical analysis based on the direct measure that provide more detailed answers about the dilemma of this sector (Chen, 2012; UNDG, 2013). Also, by the launching of the World Bank Enterprise Surveys, most of recent empirical studies on the informal sector moved to the usage of firm-level surveys instead of household surveys (La Porta & Shleifer, 2008). This is related to the fact that firm-level surveys provide a representative sample of each economy's private sector that benchmarks the quality of the business environment in each economy. It provides direct measures of the size of the informal sector and presents information about firms' productivity, infrastructure, workers, technology and legal status.

That's why this thesis proposes different empirical analyses based on firm-level surveys that encompass the two main and largest parts constituting the informal sector in Africa; informal enterprises and informal M/SEs. In order to overcome the underlined disarray concerning the

[2] For more details on the ILO's international statistical definition, see Hussmanns (2004).

definition and the measure of the size of the informal sector, our first chapter identifies informal M/SEs according to their registration status, which is in line with the national definition adopted in Egypt. In our second and last chapters, we use firm-level data that include only formal firms, from which we derive information about the intensity of competition stemming from the informal sector. Yet, the main concern about firm-level micro surveys is the subjectivity of most of its questions. These subjectivity helps in providing interesting interpretation of the reported results, but it might cause serious econometric biases. That's why in our analysis we move from the direct usage of subjective variables (in the first chapter) to their transformation into useful indicators that are less subject to the underlined bias (in the second and third chapters). Thereby, our approach consists of using useful micro-level information to derive interesting policy implications that affect the global economy.

In what follows, it is necessary to shade the light on three main points that constitute the theoretical and empirical pillars of our study. a) The informal sector controversy, b) The informal sector entrepreneurship, and c) The informal sector endurance.

a. The informal sector controversy - Informality and economic development in Africa

The recent growth recovery of African economies is largely attributed to the enhancement of its private sector. However, the growth of labour participation into that sector was not necessarily translated into sustainable employment and decent jobs for all, but rather into more informal activities. Therefore, the informal sector in Africa is considered today as the main source of job creation not only for the marginalized population that includes the poorest, women, youth, and unskilled labour, but also for the unemployed educated and underemployed workforce. According to ILO (2015), the share of informal employment in total non-agricultural employment is 66% in Sub-Saharan Africa and 52% in North Africa (40.6% in Egypt in 2012). Female labour participation is generally very low in North Africa (about 25%), but their share in informal activities outweighs that of male in Sub-Saharan Africa (74% against 61%). Also, self-employment represents the core of the informal sector; it occupies the largest share of informal employment, representing 53% of non-agricultural employment in sub-Saharan Africa and 31% in North Africa (38.9% in Egypt in 2013).[3]

As argued by Jütting (2009) and Maloney (2004), the growth of the informal sector in Africa is also a sign of popular resistance. Institutions' imperfection and government's incapacity to provide a

[3] Data on the Egyptian economy are retrieved from the Wold Development Indicators and Charmes (2012).

sound business environment lead to the dysfunctional of the social contract between the state and its citizens. That's why the prevalence of informality is the response to the combination of three main factors. The first is the severity of bureaucracy and corruption practices that impose an extra burden on registration and licensing procedures (Djankov et *al.*, 2010). The second is the severity of regulations and taxation, as well as the government incapacity to enforce the law. The third is related to the failure of the formal sector benefits in terms of access to sound infrastructure, finance, training, modern technology and effective legal and social protection (Godfrey, 2015).

As the informal sector is the fundamental characteristic of underdevelopment, it should be at the centre of the debate when tackling new development prospects (Loayza, 2016). That's why our thesis tries to derive conclusion about the contribution of the informal sector in economic development by looking at the interactions between the formal and informal sectors. Yet, there is a large disarray in the literature between theories and empirics in that matter.

Theoretically, according to Perry et *al.* (2007), there are risks of efficiency loses due to the absence of economies of scales in the informal sector. Moreover, as informal activities do not comply with any regulation and law, they have an advantage in cost that allows them to compete against formal activities. This leads to unfair competition that might slow down the creative destructive process that squeezes out inefficiencies (OECD, 2009). However, firms' self-selection into industries with low scale production is not necessarily unproductive because some industries are mainly based on labour-intensive technologies and do not require increasing returns to scale. Therefore, even though informality has a widespread negative impact on aggregate growth, increasing informality could generate positive outcomes by positively affecting the standard determinants of growth such as human, financial capital and GDP per capita.

Empirically, La Porta & Shleifer (2008) failed to find a clear conclusion on the contribution of the unofficial economy in economic development in African, Asian, and Latin American countries. They rather pointed out that productivity growth comes from formal larger firms. Moreover, using a cross-country dimension, Loayza & Rigolini (2006) suggested that informality has a counter-cycle effect on GDP per capita on the long run. This effect is lowered on the short run in economies with larger informal employment and with better policies and regulations. Nevertheless, Bigsten et *al.* (2004) found no significant productivity gap between small formal firms and their informal counterparts in Kenya, whilst formal firms have more investment and exporting opportunities.

Therefore, determining whether the informal sector should be considered as a driver or an opponent to growth remains an ongoing debate. Thus, regardless the real economic impact of

informality, we put forward - as advocated by Sparks & Barnett (2010) - the necessity of recognizing the importance of the informal sector in Africa by effectively integrating it in the economy. That's why, this thesis underlines the potential positive effects that informality could generate. Our empirical approach tests, form one hand, the combination effects between M/SEs' productivity, informality and access to funding (chapter 1). From the other hand, it emphasizes the interactions between the formal and informal sectors under a different angle that accounts for informal firms' competition (chapter 2 & 3). In the next section we explain how the informal sector moved from being completely neglected to actively and efficiently contributing in economic development.

b. The informal sector entrepreneurship - Formal-informal firms' interactions in Africa

Part of the underlined disarray on the contribution of the informal sector in economic development lies within the different views of multiple schools of thoughts that tried to question the nature of the informal sector and its implications on the economy by looking at its interaction with the formal sector.

According to the Dualist School (Hart, 1973; ILO, 1972), the informal and formal sectors coexist but are very different by nature. Some researchers expected that informal firms disappear with economic development (Lewis, 1954; Harris & Todaro, 1970), and others expected a more persistent and dangerous dual market that engenders market imbalances (Singer, 1970). However, the Structuralist School (Moser, 1978; Castells & Portes, 1989) suggested that both sectors are linked by nature because informal firms are subordinated to formal ones and allow these last to reduce costs and increase competitiveness. Similarly, the legalistic approach (De Soto, 1990) argued in favour of the informal sector because activities in this sector have the willingness to formalize if the government provides them property rights and alleviates registration procedures. Yet, the Voluntarist approach (Lewis, 2004) considered informal firms as a threat since informal firms cause unfair competition and are able to inefficiently take market shares from more productive formal firms.

These different views call on the importance of quantitative and empirical studies to link between theories and practices, and to find closer explanation of the endurance of the informal sector. That's what encouraged recent studies in management and entrepreneurship research to open up the debate about the entrepreneurial capacity of the informal sector, by looking beyond its widespread negative effect.

The underlined entrepreneurial capacity is derived from the fact that informal firms are usually small and managed by a single person. They have more simple communication strategies and more flexible production processes comparing to formal ones. They are able to quickly move where there is a demand and to serve the market with new and less expensive products and services. Moreover, they can easily adapt their labour organization and internal management to handle different market shocks (Saviotti and Pyka, 2008; Gülbiten and Taymaz, 2000; Duchêne and Rusin, 2002). They are also able to provide goods and services with lower prices, good quality and rapidly, which make them strong competitors (Williams & Martinez-Perez, 2014).

The informal sector also allows for a better allocation of economic resources by exploiting idled ones. Williams et *al.* (2016) showed that a better allocation of resource, by engaging in late registration, could be beneficial for the firm. Other studies (such as Chen, 2012; Williams, 2014) highlighted the importance of linkages from which both formal and informal firms can benefit. As the informal sector provides the market with cheaper goods, services and materials, formal firms engage in effective backward and forward linkages through subcontracting and outsourcing practices with the informal sector (Grimm & Günther, 2005; Böhme & Thiele, 2012).

That's why, according to Maloney (2004, p.1), the informal sector in developing countries should be evaluated as "*an unregulated micro-entrepreneurial sector and not as a disadvantaged residual of segmented labour markets*". As argued by Webb et *al.* (2009 & 2013), the informal sector holds many opportunities. Also, as emphasized by Amor-s et *al.* (2016), this sector is a practical substitute for the formal sector in countries with weak institutions, burdensome cost and procedures, and resource-constrained business environment. They also found a positive relationship between informality and economic development measured by country-level income and non-income Human Development Index.

Hence, empirical studies showed that none of the above theoretical views is totally summarizing the impacts of informality. Based on these studies, our thesis shades the light on the following hypothesis: the entrepreneurial capacity of the informal sector does not hold in all circumstances (chapter 1). However, the total eradication of the informal sector, especially in developing countries, is not necessarily the most effective solution (chapter 2 & 3). Yet, in the next section we will show to what extent the weaknesses of the business environment in African economies is susceptible to hinder the growth of formal firms and to jeopardize any potential positive effects brought by the informal sector.

c. The informal sector endurance - Business environment in Africa as the main driver of informality growth

Many researches made it clear that the growth of the informal sector in Africa is a symptom of the weaknesses of the business environment (De Soto, 1990; Benjamin & Mbaye, 2014). This is largely related to the existence of multiple institutional deficiencies in terms of taxation, regulations, and weak law enforcement, as well as in terms of firms' access to sources of finance, training, and sound infrastructure. The endurance of these deficiencies in Africa is hindering the sustainable growth of firms and is jeopardizing any positive outcomes that could be generated from the informal sector and its interaction with the formal one (Eifert et *al.*, 2005; Ayagari et *al.*, 2008).

Comparing to other regions in the world, figure 3.1 (appendix 3) shows that Sub-Saharan Africa is the worst in ease of doing business (ranked 131/190). MENA region is performing better but remains very far from the frontier (ranked 112/190). Figure 3.2 (appendix 3) reports a similar pattern when comparing the regulatory quality and the regulatory efficiency in each region. Yet, biggest gaps between regulatory quality and regulatory efficiency figure in MENA and Sub-Saharan Africa. This is mainly due to the weaknesses of governance indicators in these regions. As presented in figure 3.3 (appendix 3), the average ranking of these indicators is always below the median.[4] The highest average rank is reported for the rule of law in North Africa (31/100), while it is reported for the control of corruption in Sub-Saharan Africa (28/100). Yet, the average rankings of the government effectiveness and regulatory quality remain at very low levels which reflects the government incapacity to provide public services, and to formulate and implement sound policies and regulations that permit and promote the development of the private sector. According to table 3.1 (appendix 3), Egypt appears among the least efficient North African countries in governance indicators. Regarding Sub-Saharan African countries, the most efficient countries are Rwanda, Ghana and Cabo Verde, while the least efficient ones are Somalia, Central African Republic and the Democratic Republic of Congo.

According to the World Bank Enterprise Surveys (figure 3.4, appendix 3), on average per region, more than 35% of surveyed formal firms in Sub-Saharan Africa perceive access to electricity, finance, and corruption practices as major constraints, while more than 30% of surveyed formal firms in North Africa perceive corruption practices and tax rates as major constraints. Therefore, for most of the countries in Africa, the business environment remains very challenging for formal

[4] The percentile rank of the governance indicators ranges from 0 (for the lowest) to 100 (for the highest).

firms (especially for Sudan, South Sudan, Egypt, Mali, Côte d'Ivoire and Burkina-Faso).[5] The obstacles faced by those firms are a reflection of the intense institution imperfections presented above. They also explain the reason behind the incredible expansion of the informal sector.

Despite this burdensome business environment, the last doing business report (2017) confirms that African economies are actively reforming (figure 3.5, appendix 3). Among the ten most improvers in 2013/2014, five were from Africa – Benin, Togo, Côte d'Ivoire, Senegal and the Democratic Republic of Congo (IFC, 2015). This year, 77% of countries in Sub-Saharan Africa are implementing at least one reform, especially in the area of resolving insolvency. Similarly, Egypt is actively implementing reforms in the area of starting a business and trading. Nevertheless, much progress is needed to create a more friendly business environment and to attract foreign and local investments. That's why the chapters constituting this thesis underline the effect of many firm-level constraints, especially taxation, regulations and access to sources of finance.

To sum up, we can notice that the common consensus that has been drawn from most of recent studies concerns the importance of integrating the informal sector in the new development agenda in order to achieve inclusive growth and sustainable development (Chen, 2012; UNDG, 2013). These studies also underline the necessity of adopting a new model that encompasses the formal and informal sectors, based on more empirical researches that bridge theories with practices. This is exactly the aim of our thesis that adopts micro-level approaches to derive macroeconomic policies in terms of the contribution of the informal sector in economic development and the enhancement of the private sector in Africa.

Therefore, the three points presented above lead us to the core of our thesis entitled

d. Towards a better integration of the informal sector - Three empirical essays on the interaction between formal and informal firms in Egypt and beyond

In our first chapter, we approach our main topic by focusing on one of the largest part composing the informal sector in Egypt; micro and small enterprises (M/SEs). The importance of M/SEs in developing countries, and more particularly in Egypt, incited researchers to focus separately on three main aspects, namely, the informality of M/SEs, its gender aspects and its access to funding (Beck & Demirguc-Kunt, 2006; Beck et *al.*, 2005 & 2008; Elbadawi & Loayza, 2008; El-Hamidi & Baslevent, 2010; El-Hamidi, 2011; Hendy & Zaki, 2013). That's why in our first chapter we add to

[5] For a global view of the characteristics of the business environment in Africa, see table 3.1 in appendix (3).

the literature by testing the simultaneous relationship between these three aspects and their impacts on M/SEs' productivity. We assume that the extent to which informality could negatively affect M/SEs largely depends on the characteristics of the firm and its entrepreneur. We also assume that the firm's willingness to formalize depends on the quality of the business environment, and most particularly, on the firm ability to access different sources of funding.

In the next two chapters, we question the informal sector controversy in order to find the reasons behind its strong persistence despite its negative impacts. Previous studies underlined the necessity of adopting more empirical techniques in order to find a clear conclusion about the contribution of the informal sector in economic development (La Porta & Shleifer, 2008 & 2014; Jütting, 2009). Therefore, we contribute to the literature by looking at the potential positive outcomes of the informal sector from a different point of view that accounts for formal-informal firms' competition. We provide, for the first time, empirical estimates on the effect of informal competition on the productivity of formal firms by introducing a local-level indicator of informal firms' competition in Egypt and in low-income Sub-Saharan African countries.

Unlike most of the studies on the impacts of informal firms' competition, we assume that the relationship between formal and informal firms - through competition - could be an engine for growth. From one hand, chapter (2) proposes a single-country analysis (Egypt) that identifies the channel through which informal firms' competition could generate positive outcomes to the economy. From the other hand, chapter (3) proposes a cross-country analysis (Sub-Saharan Africa) in order to generalize our first results and to test the extent to which informal firms can be considered as an economic resource rather than a threat. We assume that the effect that informal competition has on formal firms' productivity depends on other factors that account for formal firms' characteristics and on the quality of the business environment. Thereby, the findings of these chapters allow us to draw interesting policy implications on the importance of creating a sustainable business environment that allows for a more effective integration of the informal sector.

To sum up, the findings of our thesis contribute to the existing literature in different ways. First, we test the simultaneous relationship between M/SE's informality, growth and access to funding in Egypt. Second, we emphasise a new type of competition that should be considered more often, because of the growing number of informal firms in the developing world. Third, we construct a new indicator of local informal firms' competition. We then extend our estimation to a large sample of low-income Sub-Saharan African countries. Fourth, we adopt econometrics techniques

to introduce nonlinear effects that could explain more extensively the business environment associated with informal competition. Last, our results add to the literature on African economic growth by indicating the mechanisms through which the informal sector can be considered as an economic resource rather than a threat.

In what follows we present a brief review of each chapter by underlining our motivation, the methodology and data used, and by presenting the main results. Our thesis starts by examining the effect of informality based on a set of formal and informal M/SEs in Egypt. We then rely on a group of formal firms to examine informality's implications on the private formal sector in Egypt and Sub-Saharan Africa.

Chapter 1 ***Informality of micro and small enterprises in Egypt - A cross-section analysis***

Since the eighties, substantial reforms targeting the enhancement of the private sector in Egypt largely encouraged the creation of M/SEs. Today, the growth of M/SEs is trapped between two situations. They are considered as the core of the productive system as they represent 99% of all establishments in Egypt, 85% of non-agricultural private sector employment, and 40% of total employment opportunities (Nasr, 2010). They play a major role in transforming small savings into effective investments, and in combating poverty and unemployment. Yet, 80% of M/SEs in Egypt operate informally which could generate serious negative impacts on the Egyptian economy (El-Mahdi, 2006 & 2010; Elbadawi & Loayza, 2008).

Therefore, the objective of our first chapter is twofold. On one hand, we review the widespread negative impacts of the informal sector by empirically testing the effect of informality on the productivity of M/SEs in Egypt. On the other hand, we test the relationship between M/SEs' productivity, informality and access to finance, as a way to find the most effective formalization mechanism. To do so, we adopt an empirical approach that is based on an instrumental variable model, using the 2003 private M/SEs dataset collected by the Economic Research Forum (OAMDI, 2013). Our sample includes a total of 4958 private M/SEs, from which 21.4% are operating informally.

Our methodology consists of testing the extent to which operating informally could affect the productivity of M/SEs included in our sample. We identify informal M/SEs based on their registration status. Thus, firms registered at the tax department and acquiring a tax card are considered as formal. In order to solve for the endogeneity arising from the causal relationship existing between the firm's registration status and its productivity, we instrument our endogenous variable of interest using firms' perception towards the severity of tax administration procedures.

And we measure M/SEs' productivity using labour productivity and total factor productivity measures. We also highlight in our analysis the main business environment constraints faced by M/SEs in Egypt, namely gender discrimination and access to financial and human capital.

Our results confirm that operating informally reduces significantly the productivity of M/SEs in Egypt. Hence, our first results are in line with Hendy & Zaki (2013) who showed that registered (formal) M/SEs perform better than their informal counterparts. Also, as emphasized by El-Hamidi & Baslevent (2010) and El-Hamidi (2011) our results show that female entrepreneurs, operating formally, could be better performing than male entrepreneurs if the barriers imposed by the family and society against female work in Egypt were removed.

However, the underlined positive effect that registration has on M/SEs' productivity is primarily subject to M/SEs' willingness to register. This willingness largely depends on the severity of tax administration procedures, the access to sound infrastructure, to technology and training, as well as firms' human and financial capital. More particularly, our model advances the importance of firms' access to different sources of finance as an essential motivation factor to formalize, which is in line with the findings of El-Mahdi & Ossman (2003) and Beck & Demirguc-Kunt (2006). We provide evidence that costs associated with formalization are initially based on the entrepreneur's internal sources (such as inheritance and savings). Once formalized, the entrepreneur has easier access to external sources of finance that s/he uses instead of internal ones, enabling him/her to extend his/her activity in the formal sector.

Therefore, reducing the number of informal M/SEs is necessary for the economy but depends on the mechanism used to induce formalization. As suggested by Elbadawi & Loayza (2008), this mechanism should not target the total enforced eradication of informal M/SEs, but rather should target the effective transition of informal M/SEs into the formal sector. According to our results, this objective could be achieved by creating a more sustainable business environment that ensure easier registration procedures, more flexible regulations, better provision of sound infrastructure and technology, and better access to funding. That's why, our findings call on the necessity of reforming the law (no.141/2004) governing M/SEs in Egypt and the mobilization of enough resources by the Social Funds for Development (SFD), the government, and the banking and private sectors to realize M/SEs intended outcomes.

In order to empirically show the necessity of integrating the informal sector in the new development agenda, the next chapters try to look beyond the negative widespread effects of the informal sector by investigating its potential positive outcomes.

Chapter 2 ***Informal competition, firms' productivity and policy reforms in Egypt***

Despite the widespread negative impacts of informality confirmed in the first chapter, figures show that the size of the informal sector continues to grow very fast in Egypt. Between 1980 and 2012, the share of informal activities in non-agricultural activities increased by 30% and reached 49.6% in 2012 (Charmes, 2012). Egypt was also ranked among the highest in the contribution of the informal economy in official GDP that attained an average of 34.9% between 1980 and 2007 (Schneider et *al.*, 2010). Based on the underlined controversy, we try in this chapter to go beyond the widespread negative impacts of the informal sector by looking at its potential positive outcomes that could arise from its interaction with the formal sector.

In fact, the Egyptian formal private sector is considered as the main contributor of recent development trends. However, as informal firms have an advantage in cost over formal ones (by not paying taxes or complying with regulations), the continuing growth of these firms generates a strong competitive pressure on formal firms, especially smaller ones. That's why informal firms' competition - characterized as "unfair" - has been considered as the third most important obstacle perceived by formal firms in Egypt (Enterprise Surveys, 2004, 2007 & 2008; OECD, 2009). However, based on the conclusion of Maloney (2004) and Williams at *al.* (2016) who studied the entrepreneurial capacity of the informal sector, we claim that informal competition could generate positive outcomes to the economy. An environment with more severe competition stemming from informal firms may induce formal firms to boost their productivity by better allocating unused resources, in order to overcome informal firms' advantage in cost and regain their market shares.

Therefore, our empirical approach consists of testing the effect of the competition stemming from informal firms on the productivity of formal ones. Our estimation is based on the Egyptian panel manufacturing World Bank Enterprise Surveys (WBES), an unbalanced panel dataset of 3020 manufacturing private formal firms interviewed in 2004, 2007 and 2008, over 23 Egyptian governorates. As informal competition is better felt on a more local-level (as suggested by Gonzalez & Lamanna, 2007), we construct a new indicator that measures the intensity of informal competition in each governorate included in the sample using the two-step methodology of Guiso et *al.* (2004). The reported scores of this indicator confirm the strong persistence of informal competition across Egyptian governorates.

Our estimation of the effect of local informal competition on formal firms' productivity reports a stable and significant positive effect. This effect remains valid when using different specifications that solve for the potential endogeneity and omitted variables biases. Moreover, based on a

difference-in-difference model, we evaluate the effectiveness of the "2005 new tax law" which is considered as the first substantial reform of the Egyptian's fiscal system that succeeded in reducing the size of the informal sector and the differential in cost between formal and informal firms. This model identifies informal firms' cost advantage as the main channel through which local informal competition would affect formal firms' productivity. Our findings suggest that the reduction of tax rates and the alleviation of tax procedures increase significantly the productivity of formal firms located in governorates with moderate to high intensity of informal competition.

Therefore, unlike Gonzalez & Lamanna (2007) and Friesen & Wacker (2013), we advocate that informal-formal firms' competition induces a better exploitation of economic resources. We also conclude that in countries with large informal sector, the implementation of effective reforms and regulation allows the reduction of the cost differential between formal and informal firms, enabling formal firms to improve their productivity and regain their market shares. Hence, our findings are in line with most of the recent studies presented by Williams (Williams, 2014; Williams & Martinez-Perez, 2014; Williams et *al.*, 2016) and that underline the informal sector's competitiveness and entrepreneurial capacity. Our findings also shade the light, once more time, on the necessity of including the informal sector in undertaken policies (i.e. competition policy). As argued by Jütting (2009), we recommend institutions in Egypt to reconsider the informal sector as an effective economic actor rather than a threat.

In order to guarantee that our results are robust and could be generalized to other countries in the region, we extent our model to include low-income Sub-Saharan African countries in the next chapter. We also try to identify the cut-off point of the informal sector positive effect and to derive more findings on the relationship between informal competition, taxation and formal firms' productivity on a larger scale.

Chapter 3 ***Informal Competition and productivity in Sub-Saharan Africa***

The dilemma raised from the debate on the informal sector is largely pronounced in Sub-Saharan Africa, especially in low-income countries. Since 2005, the African economic catch-up is coupled with a continuing growth of the informal sector that reached an average of 69.5% of non-agricultural activities between 2005 and 2010 (Charmes, 2012). Therefore, we argue that there is certainly a clear relationship between the formal and the informal sector that explains the strong persistence of this last. That's why in this chapter, we try to derive the potential positive outcome that the informal sector could generate by testing the effect of competition stemming from

informal firms on the productivity of formal firms. In addition, this chapter identifies the factors that determine the cut-off point of the underlined potential positive effect of the informal sector.

Our empirical estimation is based on a pooled sample of 10718 formal firms, located in 23 low-income Sub-Saharan African countries, and extracted from the standardised World Bank Enterprise Surveys over the period 2006-2013. We start our analysis by implementing an endogenous switching regression model that confirms the existence of a significant productivity gap in favour of formal firms perceiving informal firms' competition as a binding constraint comparing to those who do not. Then, in order to have a local measure of the intensity of informal firms' competition, we update the two-step methodology of Guiso et *al.* (2004) to construct an indicator that measures the intensity of informal competition in each city included in our sample.

Our estimation of the effect of local informal competition on formal firms' productivity reports a positive and significant effect. Hence, through competition, informal firms in Sub-Saharan Africa can have an entrepreneurial capacity that allows them to engage in an efficient relationship with formal firms and to generate positive outcomes to the economy. Yet, as underlined separately in many studies (Eifert et *al.*, 2005; Ayagari et *al.*, 2008; Amin, 2010), we show that the underlined positive effect is segmented by formal firms' size, sector of activity and current labour regulations. Larger firms operating in the service sector and facing less sever labour regulations are more susceptible to boost their productivity by creating economy of scales and by better allocating their resources.

We test the validity of our initial results by adopting an instrumental variable approach that helps eliminating the potential endogeneity and omitted variable biases. We follow Fisman & Svensson (2007) methodology by testing the relationship between informal competition, taxation and formal firms' productivity, using group averages by location and industries as instruments. Our results remain robust to our initial estimation. We also find that the direct effect of taxation on formal firms' productivity implies an indirect effect of informal competition on formal firms' productivity. The higher is the taxation rate, the bigger is the cost differential between formal and informal firms, and the stronger is informal firms' capacity to compete and to take market shares. By consequence, formal firms are motivated to boost productivity by adopting more efficient internal organisation techniques and by better allocating resources, enabling them to regain their market shares.

Therefore, by applying a cross-country analysis using firm-level data, we are also able to show that the informal sector has an entrepreneurial capacity, which complement the findings of recent

studies in management (Williams, 2014; Williams & Martinez-Perez, 2014; Williams et *al.*, 2016). We are also able to derive some interesting macroeconomic policy implications. As advocated by Djankov et *al.* (2010) and Benjamin et *al.* (2012), our findings advance the importance of creating a more sustainable business environment for formal firms, especially in terms of alleviating taxation and regulations. This environment should also recognize the importance of the informal sector and its ability to generate positive outcomes to the economy. We can thus conclude that an upstream institutions' intervention is necessary to ensure the effective integration of the informal sector into the global economy and its successful shifting to the formal sector.

References

Amin, M. (2010). How do manufacturing and service firms differ within the informal sector. (Entreprise note No. 14). Washington, DC: International Finance Corporation, World Bank.

Amor-s, J., Couyoumdjian, J., Cristi, O., & Minniti, M. (2016). The bottom-up power of informal entrepreneurship. In Sauka, S., Schneider, F., & Williams, C. C. (Eds.). *The bottom-up power of informal entrepreneurship* (pp. 9-29). Cheltenham, UK: Edward Elgar Publishing.

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2008). How important are financing constraints? The role of finance in the business environment. *The World Bank Economic Review*, *22*(3), 483-516.

Bangasser, P. E. (2000). *The ILO and the informal sector: an institutional history*. Geneva, Switzerland: International Labour Office.

Beck, T., & Demirguc-Kunt, A. (2006) Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking and Finance*, *30*(11), 2931-2943.

Beck, T., Demirguc-Kunt, A., & Levine, R. (2005). SMEs, growth, and poverty: cross-country evidence. *Journal of economic growth*, *10*(3), 199-229.

Beck, T., Demirguc-Kunt, A., & Maksimovic, V. (2008) Financing patterns around the world: Are small firms different?, *Journal of Financial Economics, 89*(3), 467-487.

Benjamin, N., & Mbaye, A. A. (2014). *Informality, growth, and development in Africa*. (WIDER Working Paper No. 2014/052). Helsinki, Finland: United Nations University World Institute for Development Economics Research.

Benjamin, N., Mbaye, A. A., & Diop, I. T. (2012). *The informal sector in Francophone Africa: firm size, productivity, and institutions*. Washington, DC: World Bank: World Bank Publications.

Bigsten, A., Kimuyu, P., & Lundvall, K. (2004). What to do with the Informal Sector?. *Development Policy Review*, *22*(6), 701-715.

Böhme, M., & Thiele, R. (2012). Is the informal sector constrained from the demand side? Evidence for six West African capitals. *World Development*, *40*(7), 1369-1381.

Castells, M., & Portes, A. (1989). World Underneath: The Origins, Dynamic and Effects of the Informal Economy. In Portes, A., Castells, M., & Benton, L. A. (Eds.). *The Informal Economy: Studies in Advanced and Less Developed Countries* (pp. 11-40). Baltimore, MD: Johns Hopkins University Press.

Charmes, J. (2012). The informal economy worldwide: trends and characteristics. *Margin: The Journal of Applied Economic Research*, *6*(2), 103-132.

Chen, M. A. (2012). The informal economy: Definitions, theories and policies. (*Working Paper* No.1). Cambridge, MA, USA: Women in informal economy globalizing and organizing (WIEGO)

De Soto, H. (1990). *The other path: The invisible revolution in the third world*. New York: Harper and Row.

Djankov, S., Ganser, T., McLiesh, C., Ramalho, R., & Shleifer, A. (2010). The effect of corporate taxes on investment and entrepreneurship. *American Economic Journal: Macroeconomics*, *2*(3), 31-64.

Duchêne, G., & Rusin, P. (2002). Micro-entreprises, croissance et mutations de l'emploi dans les pays en

transition. Revue économique, *53*(3), pp. 637-646.

Eifert, B., Gelb, A., & Ramachandran, V. (2005). Business environment and comparative advantage in Africa: Evidence from the investment climate data. (Working paper No. 56). Washington, D.C., United States: Center for Global Development.

Elbadawi, I., & Loayza, N. (2008). Informality, employment and economic development in the Arab world. *Journal of Development and Economic Policies*, *10*(2), 25-75.

El-Hamidi, F. (2011). How do women entrepreneurs perform? Empirical evidence from Egypt. (ERF Working Paper No. 621). Cairo, Egypt: Economic Research Forum.

El-Hamidi, F., Baslevent C. (2010). The gendered aspects of MSES in MENA: Evidence from Egypt and Turkey. (ERF Working Paper No. 535). Cairo, Egypt: Economic Research Forum.

El-Mahdi, A. (2006). *MSEs Potentials and Success Determinants in Egypt 2003-2004, Special Reference to Gender Differentials* (ERF Policy research report No. 0418). Cairo, Egypt: Economic Research Forum.

El-Mahdi, A. (2010). Poverty and informality: a restraining or constructive relationship?, (ERF Working Paper No. 569). Cairo, Egypt: Economic Research Forum.

El-Mahdi, A., Osman, M. (2003). *An assessment of the effectiveness of small and micro-enterprises finance in employment creation* (ERF Policy research report No. 0313). Cairo, Egypt: Economic Research Forum.

Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank.

Fisman, R., & Svensson, J. (2007). Are corruption and taxation really harmful to growth? Firm level evidence. *Journal of Development Economics*, *83*(1), 63-75.

Friesen, J., & Wacker, K. (2013). Do Financially Constrained Firms Suffer from More Intense Competition by the Informal Sector? Firm-Level Evidence from the World Bank Enterprise Surveys. (Discussion Paper No. 139). Göttingen, Germany: Courant Research Centre.

Godfrey, P.C. (2015). Introduction: Why the informal economy matters to management. In Godfrey, P.C. (Ed.) *Management, society, and the informal economy* (pp. 1–20). London, UK: Routledge.

Gonzalez, A. S., & Lamanna, F. (2007). *Who fears competition from informal firms? Evidence from Latin America* (Report No. 4316). Washington, DC: The World Bank.

Grimm, M., & Günther, I. (2005). Inter-and intra-household linkages between the informal and formal sector: a case study for Urban Burkina Faso. (Research paper No. 2005/14). WIDER Research Papers, United Nations University (UNU).

Gülbiten, Ö., & Taymaz, E. (2000). Are Small Firms Inefficient? A Schumpeterian Analysis of Productivity Differentials. *Department of Economics, Middle East Technological University, Ankara.*

Guiso, L., Sapienza, P., & Zingales, L. (2004). Does local financial development matter?. *The Quarterly Journal of Economics*, *119*(3), 929–969.

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: a two-sector analysis. *The American economic review*, *60*(1). 126-142.

Hart, K. (1973). Informal income opportunities and urban employment in Ghana. *The journal of modern African studies*, *11*(01), 61-89.

Hendy, R., & Zaki, C. (2013). On informality and productivity of micro and small enterprises: Evidence from MENA countries. *International Journal of Entrepreneurship and Small Business*, *19*(4), 438-470.

Hussmanns, R. (2004, February). Statistical definition of informal employment: Guidelines endorsed by the Seventeenth International Conference of Labour Statisticians. In *7th Meeting of the Expert Group on Informal Sector Statistics (Delhi Group)* (pp. 2-4).

ICF. (2015, February). Measuring the business environment for the African continent. *The Investment Climate Facility for Africa.* Retrieved from www.icfafrica.org/download/document/6d0262ea-da73-47f2-b602-a46c00bdd5b0

International Labour Office. (1972). *Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya.* Geneva, Switzerland: International Labour Office.

International Labour Office. (2015, May 18). Five facts about informal economy in Africa. ILO news. Retrieved from http://www.ilo.org/addisababa/whats-new/WCMS_377286/lang--en/index.htm.

Jütting, J. (2009). *Is informal normal?: towards more and better jobs in developing countries*. Jütting, J. &. De Laiglesia, J. R. (Eds.). Paris, France: Development Centre of the Organisation for Economic Co-operation and Development.

Kaufmann, D., & Kaliberda, A. (1996). Integrating the unofficial economy into the dynamics of post-socialist economies: A framework of analysis and evidence. (Policy Research Working Paper Series No. 1691). Washington, DC: The World Bank.

La Porta, R., & Shleifer, A. (2008). The unofficial economy and economic development. *Brookings Papers on Economic Activity, 2008*(2), 275-363.

La Porta, R., & Shleifer, A. (2014). Informality and Development. *Journal of Economic Perspectives*, *28*(3), 109-126.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester school*, *22*(2), 139-191.

Lewis, W. W. (2004). *The power of productivity: Wealth, poverty, and the threat to global stability*. University of Chicago Press.

Loayza, N. V. (2016). Informality in the Process of Development and Growth. *The World Economy*, *39*(12), 1856-1916.

Loayza, N. V., & Rigolini, J. (2006). Informality trends and cycles. (World Bank Policy Research Working Paper 4078). Washington, DC: World Bank.

Maloney, W. F. (2004). Informality revisited. *World development*, *32*(7), 1159-1178

McKenzie, D., & Sakho, Y. S. (2010). Does it pay firms to register for taxes? The impact of formality on firm profitability. *Journal of Development Economics*, *91*(1), 15-24.

Moser, C (1978), Informal Sector or Petty Commodity Production: Dualism or Dependence in Urban Development?. *World Development, 6(*9-10), 1041-1064.

Nasr, S. (2010). *Egypt, Arab Republic of Egypt- Enhancing Access to Finance for Micro and Small Enterprises* (Implementation Status Results Report, Sequence 01). Washington, DC: the World Bank.

OAMDI, 2013. Micro and Small Enterprises Survey (MSEs), http://www.erf.org.eg/cms.php?id=erfdataportal. Version 1.0 of Licensed Data Files; Egypt MSEs 2003. Egypt: Economic Research Forum (ERF).

Organisation for Economic Cooperation and Development. (2009). *Competition Policy and the Informal Economy*. Paris, France: OECD.

Perry, E., Maloney, W. F., Arias, O. S., Fajnzylber, P., Mason, A. D., & Saavedra-Chanduvi, J. (2007). *Informality: Exit and exclusion*. Washington, DC: World Bank Publications.

Saviotti, P. P., & Pyka, A. (2008). Product variety, competition and economic growth. *Journal of Evolutionary Economics*, *18*(3-4), 323-347

Schneider, F. (2012). The Shadow Economy and Work in the Shadow: What Do We (Not) Know?. (Discussion Paper No. 6423). Bonn, Germany: IZA Institute of Labor Economics.

Schneider, F., & Buehn, A. (2016). Estimating the Size of the Shadow Economy: Methods, Problems and Open Questions. (Discussion Paper No. 9820). Bonn, Germany: IZA Institute of Labor Economics.

Schneider, F., Buehn, A., & Montenegro, C. E. (2010). Shadow Economies all over the World: New Estimates for 162 Countries from 1999 to 2007. (Policy Research Working Paper Series No. 5356). Washington, DC: The World Bank.

Schneider, F., & Enste, D. (2000). Shadow economies around the world-size, Causes, and Consequences. (IMF working paper No. 0026). Washington, DC: International Monetary Fund.

Singer, H. W. (1970). Dualism revisited: a new approach to the problems of the dual society in developing countries. *The Journal of Development Studies*, *7*(1), 60-75.

Sparks, D. L., & Barnett, S. T. (2010). The informal sector in Sub-Saharan Africa: out of the shadows to foster sustainable employment and equity?. *The International Business & Economics Research Journal*, *9*(5), 1-11.

UNDG. (2013). Growth and Employment in the Post-2015 Agenda: Messages from a global consultation. New York, USA: United Nations Development Group.

Webb, J. W., Bruton, G. D., Tihanyi, L., & Ireland, R. D. (2013). Research on entrepreneurship in the informal economy: Framing a research agenda. *Journal of Business Venturing*, *28*(5), 598-614

Webb, J. W., Tihanyi, L., Ireland, R. D., & Sirmon, D. G. (2009). You say illegal, I say legitimate: Entrepreneurship in the informal economy. *Academy of Management Review*, *34*(3), 492-510.

Williams, C. C. (2014). *Informal Sector Entrepreneurship*. Paris, France: OECD.

Williams, C. C., & Martinez-Perez, A. (2014). Why do consumers purchase goods and services in the informal economy?. *Journal of Business Research*, *67*(5), 802-806.

Williams, C. C., Martinez-Perez, A., & Kedir, A. M. (2016). Informal entrepreneurship in developing economies: the impacts of starting-up unregistered on firm performance. *Entrepreneurship Theory and Practice*.

World Bank. (2017). *Doing Business report: Equal opportunity for all*. Washington, DC: World Bank.

World Development Indicators. Washington, DC: World Bank.

Worldwide Governance Indicators (www.govindicators.org).

Appendices

Appendix 1 Informal economy across regions

Table 1.1. Size of the informal economy across regions (weighted average by total GDP in 2005)

	Regions	mean	median	min	max	sd.
EAP	East Asia and Pacific	17.5	12.7	12.7	50.6	10.6
ECA	Europe and Central Asia	36.4	32.6	18.1	65.8	8.4
LAC	Latin America and the Caribbean	34.7	33.8	19.3	66.1	7.9
MENA	Middle East and North Africa	27.3	32.5	18.3	37.2	7.7
OECD	High Income OECD	13.4	11.0	8.5	28.0	5.7
OHIE	Other High Income	20.8	19.4	12.4	33.4	4.9
SAS	South Asia	25.1	22.2	22.2	43.9	5.9
SSA	Sub-Saharan Africa	37.6	33.2	18.4	61.8	11.7
World		17.1	13.2	8.5	66.1	9.9

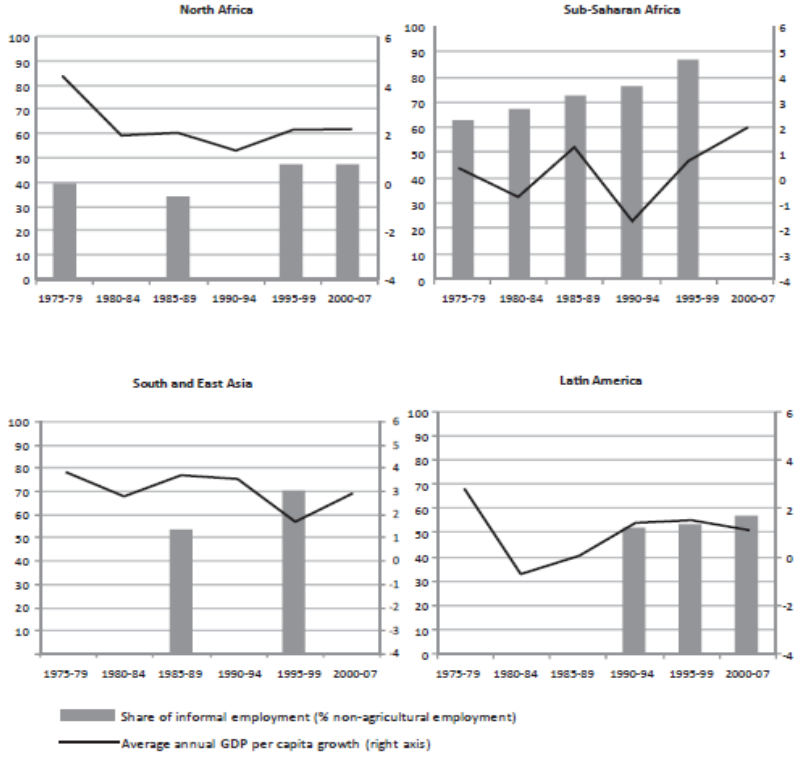
Source: Schneider et *al.* (2010).

Table 1.2. Share of informal employment in total non-agricultural employment by five year period

Region	Average share of informal employment in % of local non-agricultural employment over			
	1985-89	1990-94	1995-99	2000-07
South and Middle American countries	32.4	35.4	40.3	50.1
Asian countries	55.9	60.4	65.4	70.2
African countries	40.3	47.1	52.4	60.5
Transition countries	30.9	32.3	35.4	40.2

Source: Schneider (2012).

Figure 1.1. Informal employment and growth across regions



Source: Jütting (2009).

Appendix 2

Table 2.1. Main characteristics of the countries included in our analyses

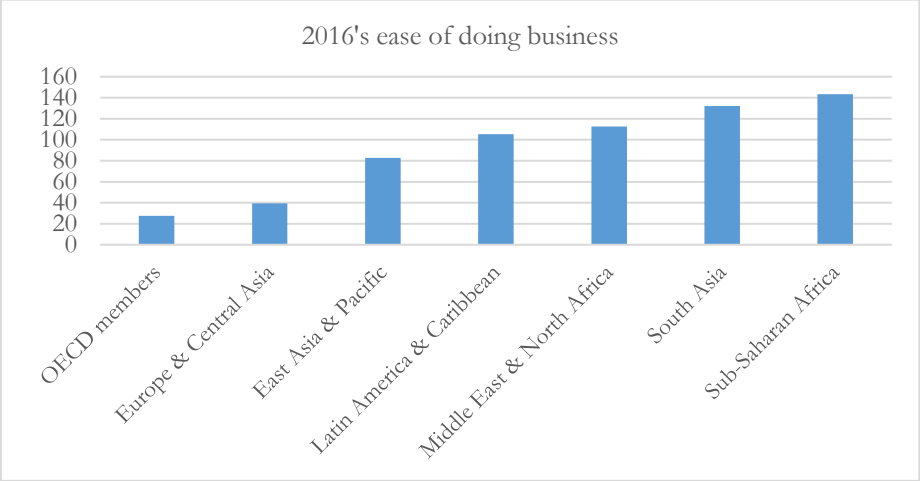
Countries	Informal economy (%GDP)	Informal employment		GDP growth (%)	Poverty headcount ratio (% population)
	(1)	(2)	(3)	(4)	(5)
Egypt	34.9	-	49.6 (2012)	4.3	25.2 (2010)
Benin	49.8	76.9	-	4.2	75.63 (2011)
Burkina Faso	40.5	65	-	5.4	74.65 (2014)
Burundi	39.5	-	-	3.6	92.17 (2006)
Central African Republic	45	-	-	-0.7	82.27 (2008)
Chad	43.7	38	-	4.8	64.82 (2011)
Democratic Republic of Congo	47.3	80	-	6.6	90.7 (2012)
Ethiopia	38.6	61	**41.4 (2004)**	10.4	71.27 (2010)
Gambia	44.3	80	-	3.5	68 (2003)
Guinea	39	79	-	2.15	68.65 (2012)
Guinea-Bissau	40.9	-	-	3.2	83.59 (2010)
Liberia	44.2	35	**49.5 (2010)**	6.2	89.61 (2007)
Madagascar	40.8	57.5	89.3 (2012)	2.7	90.47 (2012)
Malawi	41.8	51.7	-	5.7	87.64 (2010)
Mali	40.7	36	**81.8 (2004)**	4.1	77.71 (2009)
Mozambique	39.8	-	-	7.2	87.54 (2008)
Niger	40.4	48.9	-	5.6	75.46 (2014)
Rwanda	40.1	75	-	7.6	80.6 (2013)

Senegal	43.7	62.4	-	3.8	66.26 (2011)
Sierra Leone	45.6	70	-	2.6	79.96 (2011)
Tanzania	56.4	42.2	76.2 (2006)	6.4	76.1 (2011)
Togo	34.9	38.9	-	4	74.54 (2011)
Uganda	42.3	56.4	93.5 (2013)	6.7	64.95 (2012)
Zimbabwe	61.8	33.9	40.7 (2004)	2.3	45.5 (2011)

Notes: column (1) presents the percentage of informal economy in official GDP (period average 1999-2007). Data are from Schneider (2012). Column (2) presents the percentage of informal employment in the total official labour force in 1998. Data are from Schneider (2012). Column (3) presents the percentage of informal employment in total non-agricultural employment for the last available year (between brackets). Data for Egypt are from Charmes (2012), underlined data are from the World Development Indicators, and data in bold are from ILO (2012). Column (4) presents the percentage of annual GDP growth for the period average 2006-2015 (and 2005-2015 for Egypt). Data are from the World Development Indicators. Column (5) presents the poverty headcount ratio at $3.10 a day (2011 PPP) and at national poverty line (for Egypt) in percentage of population for the last available year (between brackets). Data are from the World Development Indicators. Table computed by the author.

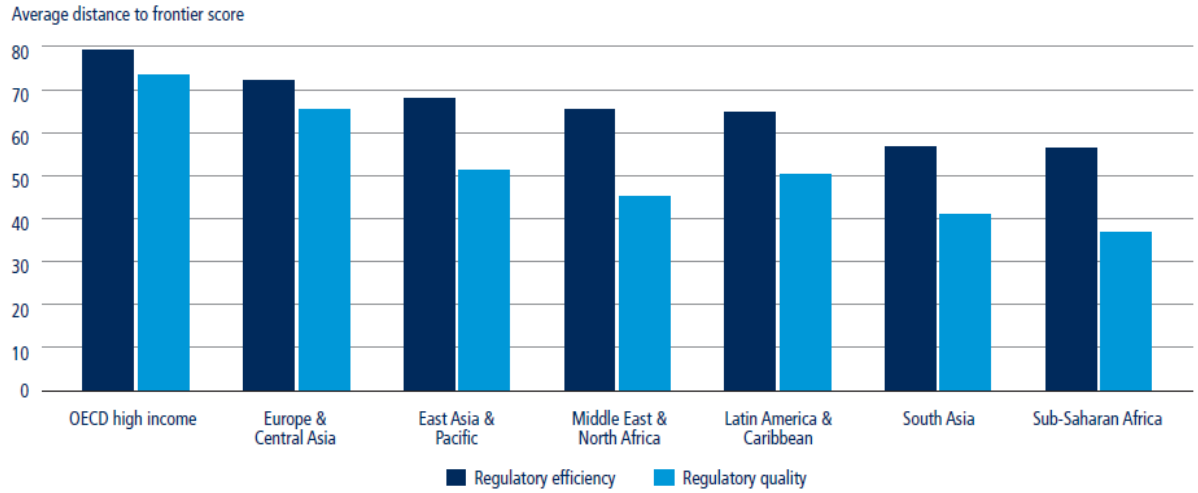
Appendix 3 Business environment in Africa

Figure 3.1. Ease of doing business across regions



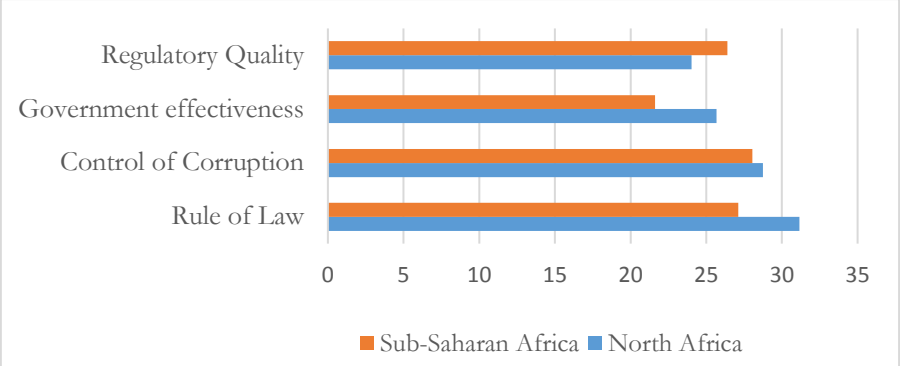
Source: Computed by the author using the World Development Indicators.

Figure 3.2. Gap between regulatory efficiency and regulatory quality across regions



Source: World Bank (2017).

Figure 3.3. Governance indicators in Africa



Source: Computed by the author using the Worldwide Governance Indicators.

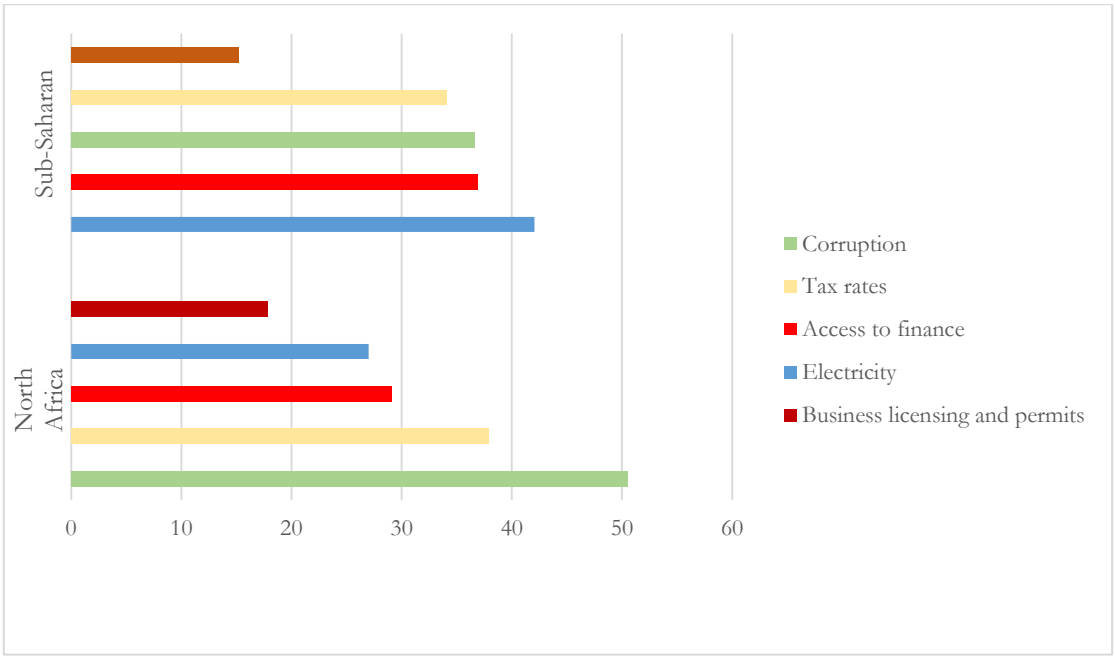
Table 3.1. Main characteristics of the business environment in Africa

Country Name	2015 Ease of doing business index (1=most business-friendly regulations)	2015 Procedures to register property (number)	Governance Indicators (average 1996-2015)				Firm-level constraints (% of firms identifying the following as major constraint)					
			Government effectiveness	Regulatory Quality	Rule of Law	Control of Corruption	**Years**	corruption	access to finance	electricity	tax rates	licensing and permits
	(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)	(9)	(10)	(11)
Tunisia	75	4	49.04	38.94	56.25	55.29	**2013**	36.0	23.9	8.6	15.9	2.8
Morocco	68	6	50.48	49.04	54.81	50.48	**2013**	53.1	27.7	24.5	31.5	14.0
Egypt, Arab Rep.	126	8	22.12	24.52	35.58	35.1	**2013**	59.0	28.5	35.7	20.4	17.2
Sudan	164	6	6.25	4.81	8.17	2.4	**2014**	64.7	15.3	7.6	76.8	24.7
South Sudan	187	9	0.48	2.88	0.96	0.48	**2014**	40.1	50.0	58.6	44.7	30.7
Av. North Africa	124	6.6	25.67	24.03	31.15	28.7		50.58	29.08	27	37.86	17.88
Benin	153	4	30.29	30.77	32.21	30.77	**2016**	39.5	43.2	60.4	46.9	2.9
Burkina Faso	142	4	31.73	41.83	34.13	47.12	**2009**	70.4	75.0	53.9	75.7	17.6
Burundi	155	5	12.02	27.4	11.54	10.1	**2014**	54.1	36.7	46.9	69.9	5.9
Cabo Verde	125	6	59.62	45.19	70.67	78.85	**2009**	29.8	36.7	53.1	51.8	11.9
Cameroon	167	5	21.63	19.23	15.87	12.98	**2016**	42	41.1	51.6	41.8	21.3
Central African Republic	186	5	1.44	5.29	1.44	6.25	**2011**	41.4	46.0	76.1	31.9	18.7
Chad	183	6	6.73	9.62	10.1	6.73	**2009**	67.2	46.5	74.6	59.7	36.6
Comoros	152	4	5.77	12.98	20.19	30.29						
Congo, Dem. Rep.	184	7	3.85	6.25	3.37	9.13	**2013**	57.7	39.1	52.2	27.9	23.1
Congo, Rep.	176	6	14.9	10.1	13.46	9.62	**2009**	65	44.8	71.1	40.9	28.7
Cote d'Ivoire	139	6	28.37	32.69	30.29	42.31	**2016**	73.6	69.1	62.7	62.6	22.0
Djibouti	168	6	16.35	28.37	18.27	33.65	**2013**	39.2	11.8	47.3	25.2	12.2
Eritrea	189	11	4.81	1.44	4.81	5.29	**2009**	0.0	0.9	0.2	1.1	6.2
Ethiopia	159	7	28.85	14.42	38.46	42.79	**2015**	27.9	20.3	33.3	22.8	6.4
Gambia, The	150	5	18.75	34.62	29.33	21.63	**2006**	9.8	40.3	78.1	30.7	18.1
Ghana	111	5	44.71	53.37	60.58	53.37	**2013**	43.5	62.2	61.2	52.2	16.5
Guinea-Bissau	177	8	4.33	9.13	6.73	3.37	**2006**	44.0	71.6	74.1	44.0	14.3

Guinea	161	6	12.5	20.67	9.13	15.38	**2016**	31.3	30.4	32.1	36.1	7.9
Kenya	113	9	43.75	43.27	36.54	13.46	**2013**	21.3	17.2	22.2	18.1	18.7
Lesotho	112	4	26.92	39.42	50.96	60.1	**2016**	50.7	32.8	24.8	38.1	29.3
Liberia	174	10	7.69	19.71	19.23	31.25	**2009**	31.2	35.0	59.1	19.0	17.5
Madagascar	169	6	8.65	25.96	28.85	24.04	**2013**	30.2	12.6	25.5	15.6	5.8
Malawi	141	6	26.44	23.08	44.23	23.08	**2014**	30.1	34.9	24.8	35.6	11.2
Mali	143	5	17.79	30.29	25	29.81	**2016**	70.6	63.5	67.9	35.8	39.4
Mauritania	165	4	13.94	21.15	21.15	16.35	**2006**	17.1	52.4	57.9	49.4	32.0
Mozambique	134	6	23.08	34.13	19.71	20.67	**2007**	25.4	50.1	24.8	30.8	13.7
Niger	158	4	30.77	26.44	30.77	33.17	**2009**	83.7	62.0	63.2	60.4	11.7
Nigeria	170	12	16.83	21.63	12.98	11.06	**2014**	44.8	33.1	48.4	18.5	9.3
Rwanda	59	3	51.44	60.58	60.1	75	**2011**	15.4	35.1	15.4	31.3	7.7
Sao Tome and Principe	160	7	22.6	25.48	21.63	52.4						
Senegal	146	5	38.94	48.56	51.92	59.13	**2014**	26.6	51.6	48.2	29.2	7.0
Sierra Leone	145	7	9.62	20.19	17.79	21.15	**2009**	36.9	34.6	53.4	42.5	17.7
Somalia	190	5	0	0.96	0	1.44						
Swaziland	108	9	34.13	33.17	46.63	48.08	**2016**	30.4	10.0	4.2	26.0	10.2
Tanzania	144	8	31.25	41.35	39.42	25.48	**2013**	47.2	43.9	45.8	41.1	34.2
Togo	154	5	11.06	22.6	23.08	25.96	**2016**	44.7	51.2	50.1	55.8	15.2
Uganda	116	10	37.02	46.15	43.27	12.02	**2013**	19.1	19.6	26.8	21.6	15.2
Zambia	94	6	33.17	37.98	47.12	43.27	**2013**	29.8	27.4	27.1	13.7	9.4
Zimbabwe	157	5	11.54	3.85	6.25	7.21	**2016**	38.3	55.9	22.1	25.2	17.4
Average SSA	149.4615385	6.20512821	21.6225641	26.3928205	27.1079487	28.0451282		36.6641	36.88718	42.06667	34.07436	15.20256

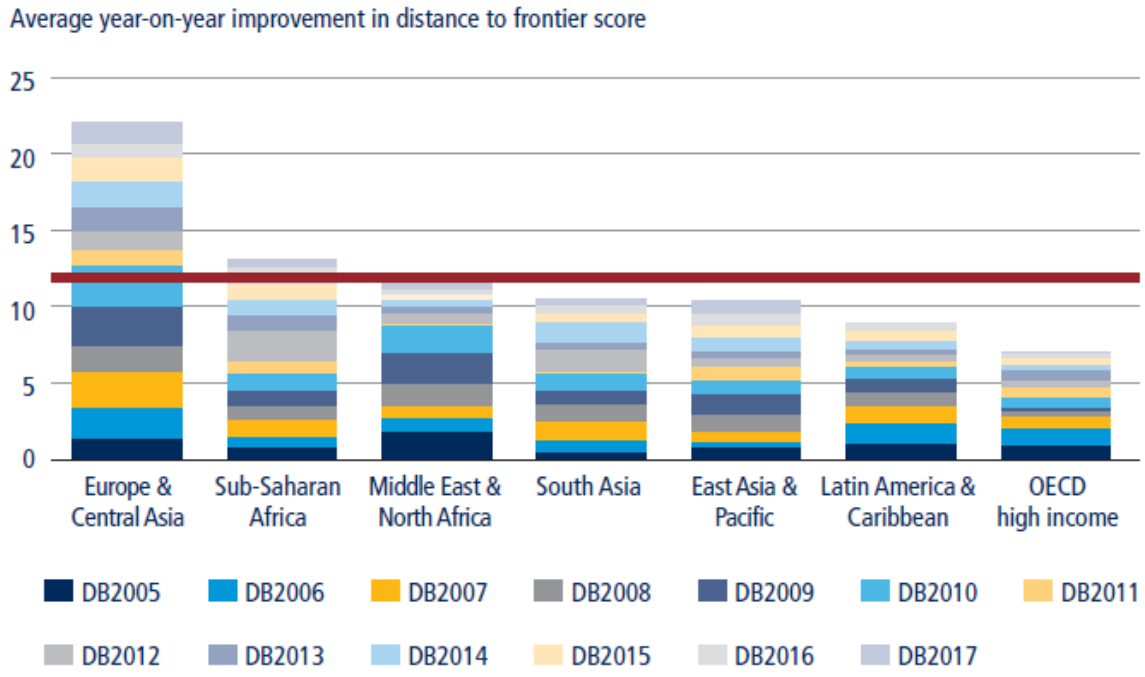
Source: Column (1) presents the 2015 Ease of Doing Business Index that ranks economies from 1 to 190, with first place being the best. Column (2) presents the number of procedures required for a business to secure rights to property in 2015. Data are extracted from the World Bank, Doing Business project (http://www.doingbusiness.org/). Columns (3-6) present the percentile rank of the governance indicators that ranges the economies from 0 (lowest) to 100 (highest) rank (aggregate indicators 1996-2015). Government effectiveness reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Regulatory Quality reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Rule of Law reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Control of Corruption reflects perceptions of the extent to which public power is exercised for private gain. Data are extracted from the Worldwide Governance Indicators. Columns (7-10) present the percentage of firms identifying corruption, access to finance, electricity, tax rates, and licensing and permits as major constraint. Data are extracted from the World Bank Enterprise Surveys Indicators (Enterprise Surveys - http://www.enterprisesurveys.org)

Figure 3.4. Firms-level constraints in African low income and lower middle income countries



Source: Computed by the author using the World Bank Enterprise Survey Indicators (Enterprise Surveys - http://www.enterprisesurveys.org)

Figure 3.5. Doing Business reforms across regions



Source: World Bank (2017).

Chapter (1)

Informality of micro and small enterprises in Egypt: A cross-section analysis[6]

Abstract

The informal sector constitutes a major issue in Egypt. Yet, micro and small enterprises (M/SEs) proved their important role on the social and economic levels. However, most of them are running on an informal basis. This chapter tries to estimate the impact of operating informally on M/SEs' productivity. It also emphasizes the simultaneous relationship between M/SEs' registration, access to finance and gender aspect. Relying on an instrumental variable approach, the results show that the higher is the probability of operating informally, the lower is the productivity of M/SEs. This effect is subject to the realization of a specific channel, which accounts for the characteristics of the firm, its entrepreneur and its constraints. Our model put forward the importance of M/SEs' access to external sources of finance to induce the formalization process. It also underlines the productivity gap between male and female entrepreneurs. Our findings call on the importance of the human and financial capitals of M/SEs to allow their transition into the formal sector.

Keywords. Informal sector, Micro and small enterprises, Firms' productivity, Tax informalities, Access to finance, Egypt.

JEL. O17, C36, D22, L25

[6]A more preliminary version of this chapter was published in French:
Ali, N. (2014). L'informalité des micro-et petites entreprises en Égypte: une analyse transversale. Mondes en développement, 166 (2), 87-100.

1. Introduction

The multiplication of Micro and Small enterprises (M/SEs) in Egypt started in the eighties as a consequence of substantial reforms. The aim of these reforms was to downsize the public sector through privatisation and to enhance the private sector through liberalization. However, these reforms created a strong pressure on the private sector which was unable to absorb the entire excess of labour force. Hence, decreasing trends in salaries and opportunities within the formal private sector, and increasing trends of poverty and youth unemployment opened the way for self-employment and informal activities to be considered as the "first-best" alternative (El-Mahdi, 2000; Assad, 2002). That's why M/SEs became very quickly the core of the productive system in Egypt, representing 99% of all establishments, 85% of non-agricultural private sector employment, and 40% of total employment opportunities (Nasr, 2010).

However, according to El-Mahdi (2006 & 2010), 80% of M/SEs in Egypt operate informally. This is mainly due to the poor business environment in which enterprises operate and grow. According to figure 1.1 (appendix 1), comparing to the Middle East and North African region (MENA), Egypt is situated below the average in ease of doing business, registering property, paying taxes and enforcing contracts. That's why Egypt reports the highest rates of self-employment and informality after Morocco (figure 1.2, appendix 1), and comes first in women's self-employment as the public sector was considered as their first shelter. Hence, the share of women's self-employment is higher than their men counterparts (table 1.1, appendix 1). Yet, the majority of women self-employed prefer to operate informally because of existing strong discrimination against women in hiring and earnings (Elbadawi & Loayza, 2008).

In fact, M/SEs (incl. self-employment and informal M/SEs) are playing a major role in creating job opportunities and in transforming small savings into investments. They also act as an effective sub-sector for larger industries and as the main sector of consumption for poor. Nevertheless, these firms choose voluntarily to operate informally to avoid burdensome taxation and regulation (De Soto, 1990). According to El-Fattah (2012), most of Egyptian employers choose to operate informally because of difficult, lengthy and costly regulations. That's why according to our dataset, more than 60% of M/SEs perceive the severity of tax rates, tax administration procedures, registration and licensing as difficult.

However, informality could have a serious effect on the performance of these businesses, especially in terms of access to government services (infrastructure, trainings and funding). The current situation is already not promising for formal and bigger firms which suffer from severe corruption

practices and taxation, and which lack access to infrastructure (especially electricity and land) and to external sources of finance (credits from bank or non-bank institutions) (World Bank, 2014). In the literature, many studies focused on the importance of M/SEs' access to finance and its relationship with growth and poverty (Beck & Demirguc-Kunt, 2006; Ayyagari et *al.*, 2008; Beck et *al.*, 2005; Beck et *al.*, 2008). Others highlighted the importance of studying M/SEs' gender aspects (El-Hamidi & Baslevent, 2010; and El-Hamidi, 2011). More particularly, studies confirmed the negative impact that informality has on M/SEs' growth in Egypt (Hendy & Zaki, 2013 and Elbadawi & Loayza, 2008). They also concluded that eradicating informality is necessary for growth, but is conditional on the formalization mechanism. That's why this chapter add to the existing literature by testing the simultaneous relationship between M/SEs' productivity, informality and access to finance, as a mean to find the most effective formalization mechanism. We also highlight M/SEs' gender aspects and the impact of severe legal procedures.

Our estimation is based on an instrumental variable approach using the 2003 private M/SEs dataset collected by the Economic Research Forum (OAMDI, 2013). This dataset covers a representative sample of 4958 private M/SEs selected from three major administrative regions and eight different governorates. 99% of firms in the sample are micro firms (with a maximum of 10 workers), from which 38% are self-employed. Also, 89% of firms' owners or managers are men operating mostly in small firms, while women entrepreneurs are more concentrated in micro firms. Moreover, the average of male workers in M/SEs is seven times higher than female workers.

We identify informal M/SEs according to their registration status. Thus, firms registered at the tax department and acquiring a tax card are considered as formal.[7] These firms represent 78% of our sample and their labour productivity is 1.8 times higher than informal M/SEs. However, there is a causal relationship between M/SEs registration status and their productivity. For this reason we instrument our endogenous variable of interest using firms' perception towards the severity of tax administration procedures. Our results show that the probability of M/SEs' registration is lowered with more severe registration procedures which affects negatively their productivity. Therefore, the monthly labour productivity of a firm is lowered by 70 percentage points when it operates informally. This finding remains robust when using total factor productivity measure for a subset of firms.

[7] According to Hendy & Zaki (2013), defining informal M/SEs according to the legal status is considered as the most restrictive definition because it means that the firms is registered at the tax department and acquired a tax card. This implies the direct registration of the firm in the commercial registry.

Yet, this effect is subject to the impact of other variables that account for the characteristics of the entrepreneur as well as the firm's financial and human capital. We find that female entrepreneurs could outperform their male counterparts, but the barriers imposed by the family and society against female work in Egypt prevent them from entering the market. Our results also call on the importance of firms' access to different sources of finance to allow the formalization process. We provide evidence that costs associated to formalization are initially based on the entrepreneur's internal sources (such as inheritance and savings). Once formalized, the entrepreneur has easier access to external source of finance (such as formal credits) that s/he uses instead of internal ones, enabling him/her to extend his/her activity in the formal sector.

This chapter is laid as follows. The next section explores an overview of the characteristics of M/SEs in Egypt. Section (3) presents a review of the literature and our hypotheses. Section (4) explores the definition and the summary statistics of the variables used in the chapter. Section (5) explains the implemented methodology. Section (6) discusses the empirical results, and the final section concludes and presents some policy implications.

2. The characteristics of Micro and Small enterprises in Egypt

M/SEs in Egypt are identified using the quantitative criterion which takes into account the number of employees, as well as the value of fixed assets and the turnover rate per enterprise. According to the Micro and Small Establishments law (2005), a Micro enterprise includes a maximum of 10 workers and EGP 50 000 of invested capital (about $8 500), and a small enterprise includes a maximum of 49 workers and one million EGP of invested capital (about $170 000).[8] According to the CAPMAS Establishment Census of 1996 and the 1998 Egyptian Labour Market survey, the percentage of M/SEs in total establishments decreased from 99.7% to 90% between 1996 and 1998.[9] However, its share increased again in 2010 and reached 99% of Egyptian enterprises, 85% of non-agricultural private sector employment, and almost 40% of total employment (Nasr, 2010).

According to the Ministry of Foreign Trade (2003), the majority of M/SEs are located in Lower Egypt, among which Dakahliya governorate has the highest percentage of M/SEs. They are also more concentrated in urban zones, among which Cairo governorate has the highest percentage of M/SEs. Comparing formal to informal M/SEs (table 2.1, appendix 2), formal workers mostly work in medium and large enterprises (*i.e.* around 60% are in enterprises with at least 50 workers), while

[8] This is also the definition employed by the dataset used in our empirical analysis.

Values in USD are based on the official average period exchange rate in 2003: 1 US$= 5.9EGP

[9] CAPMAS is Central Agency for Public Mobilization and Statistics in Egypt.

informal workers are more concentrated in micro firms (*i.e.* around 80% are in enterprises with a maximum of 10 workers). Female formal workers represent only 25.5%, while male workers represent 74.5%. Similarly, the share of male outweighs that of female in informal business (85% vs. 14%). According to the economic activity, table 2.2 (appendix 2) shows that formal and informal M/SEs are mostly concentrated in trade activities (55% for formal and 38.3% for informal firms), followed by manufacturing for formal firms (18%) and services for informal ones (30%). Comparing male and female informal workers, male are more concentrated in trade activities, while female are more concentrated in services.

According to these figures, M/SEs play a major role in supporting the national economy, especially in terms of creating job opportunities and combating poverty. That's why this sector is receiving an increased attention from the government, the banking sector, the private sector and the donors. For example, in 2004 the government established a new law (no.141/2004) governing M/SEs and according to which they became under the responsibility of the Social Funds for Development (SFD) that ensure their social and economic development.[10] The government has also undertaken many reforms to minimize entry-costs and to provide more flexible registration, taxation and licensing procedures (as the reform of the labour law in 2003 and the tax law in 2005 and 2014). Moreover, the Banking-Sector Reform Program (2008-2011), supervised by the central Bank of Egypt, devoted an integral part to the enhancement of M/SEs access to finance through the provision of simplified micro-loans by private banks. Similarly, in partnership with the SFD, the World Bank has launched in 2014 a US$300m project that provided a sustainable access to finance for M/SEs.

Despite these efforts, existing severe institutional imperfections are hindering the development of M/SEs and are pushing them to operate informally. Egypt has still a long way to go to improve its business environment (table 1.1, appendix 1). The country is ranked 122 in ease of doing business and is facing numerous challenges in terms of firms' access to infrastructure, property rights and basic services. More particularly, M/SEs are facing serious obstacles in accessing external source of funding because of their registration status (informal) and the excessive collaterals needed. That's why they rely more on informal funding mechanisms. Moreover, the post-revolution economic crisis and political instability have worsen the situation even more and raised frustration among the

[10] The SFD was established in Egypt in 1991 by a presidential decree and with the support of the United Nations Development Program.

population. According to the 2012 Egyptian Labour Market Panel survey (ELMPS), the number of M/SEs ownership has decreased between 2006 (26.3%) and 2012 (21.5%), especially in rural zones and the Upper Egypt region. Also the percentage of formal M/SEs has decreased by 7% during this period (Rashed & Sieverding, 2015). That's why effective policies must be undertaken to ensure the sustainable growth of M/SEs and the formalization process.

3. Literature review and hypotheses

The concept of "informal sector" has been introduced by Keith Hart and the ILO in 1972 (Hart, 1973). Since then, disarrays surrounding this topic created the necessity to adopt an international definition, which have been adopted by the ILO in 1993. The national definition used by the CAPMAS is compatible with the ILO's definition but is more restrictive. M/SEs are defined as "*the 'unorganized private sector,' which includes; 1) retail trading activities (four employees or less per establishment); 2) manufacturing industries and repair services (nine employees or less per establishment); or 3) business entities that are not covered by law 159/1981, Investment Law 230/1989, and unregistered in neither the Commercial Registry nor its* equivalent" (Abdelhamid & El-Mahdi, 2003, p.16).

The literature on the informal sector is very wide and presents several studies on its causes and consequences. Using household survey in Poland, Gardes & Starzec (2001) proved that the informal sector is multiplied in periods of crisis and reforms because it feeds the market with cheaper goods. This sector generates a sort of social multiplier; once a firm or a person joins this sector, related social stigma's costs disappear and people become more eager to join it. Hence, they become trapped into informality. De Soto (1990)'s experiment in Peru identified government bureaucracy as the main driver of informality. Informal firms choose voluntarily to remain informal not only to evade taxes, but also because of the lack of information concerning registration procedures, as well as their fear of punishment associated to unreported payments.

Similarly, Djankov et *al.* (2004) showed that entrepreneurial decision in Russia depends mainly on the intensity of entry barriers in terms of corruption practices and bureaucracy. Moreover, the theoretical model of Dessy & Pallage (2001) claimed that informal firms should necessarily reduce their size to be more flexible and more capable to take risks subsequent to small innovations. In consequence, productivity and salaries are lowered because of resource misallocation and their incapacity to access credits and modern technologies. And regarding firms' constraints to grow, Cull & Xu (2005) underlined the importance of property rights that guarantee easier access to source of funding in China. Moreover, Beck et *al.* (2008) identified the access to finance as the major factor that enables firms to contribute to economic development in developing countries.

Beck et *al.* (2005) opened the door for many researchers to study the key role of financial constraints. They showed to what extent development in the financial sector contributes to poverty reduction by supporting the growth of small and medium-sized enterprises (SMEs) in developing countries. Similarly, Cull and Xu (2005), Beck and Demirguc-Kunt (2006) and Beck et *al.* (2008) emphasized that financing obstacles are more growth-constraining for small firms and prevent all firms from reaching their optimal size. More recently, the World Development Report (2013) and Kuntchev et *al.* (2014) reported access to finance to be the most powerful constraint hindering firms growth in developing countries, and especially in Africa. They also found that the probability of a firm being credit constrained decreases with firm size, with higher productivity, and with higher proportion of private credits to GDP in the country.

In Egypt, Meyer (2000) discovered that the weaknesses of the regulatory environment is considered as one among several other M/SEs' daily constraints. These last also consider access to finance, training, infrastructure, and technology as major constraints. As shown by El-Hamidi (2011), the size of the tax burden has a negative impact on the size of the financial capital of the firm. That's why M/SEs access to formal financial support as formal loans and credits is considered as the main constraint facing their development due to associated costs and risks. By consequence, the majority of M/SEs move towards the adoption of other methods of internal finance as savings, inheritance and other informal sources (El-Mahdi & Osman, 2003).

Using the Egyptian Labour Market Panel Survey 1998-2006, the results of Wahba (2009)'s probit model proved that the probability of transition between the informal and semi-formal or formal sector in Egypt exists only for educated men but not for uneducated or female workers. Charmes (1990) considered the increasing rate of unemployment in Egypt as the main cause of the expansion of the informal sector that operates in the broad daylight. This fact has been confirmed by Attia (2009) who called on the importance of state intervention to draw more effective policies that allow for a more favourable business environment. Especially that informality mirrors the distortion of regulation, the lack of decent work, the underestimation of GDP and institutional distrust (African Development bank, 2006).

Based on a cross country analysis of the Arab world, Elbadawi & Loayza (2008) confirmed the negative impact of informality on firms' growth, exports and spread of poverty in Egypt. However, using the 2003 M/SEs dataset made available by the ERF, Hendy & Zaki (2013) could not found a significant productivity gap between formal and informal M/SEs in Egypt. Concerning the research presented by the Egyptian Center for Economic Studies (ECES), Galal (2004) explained

that the formalization process in Egypt will be socially accepted only if it is associated with substantial reforms that ensure better performance and work conditions. In addition, El-Fattah (2012) emphasized the importance of formal and informal firms' linkages to enhance firms' effectiveness and to encourage the formalisation process.

Therefore, this chapter adds to the existing literature by testing the simultaneous relationship between M/SEs' productivity, informality and access to finance, as a mean to find the most effective formalization mechanism. We do so by highlighting some of the important constraints faced by M/SEs in Egypt to test the validity of the following hypotheses; a) there is a strong negative relationship between operating informally and firm's productivity. This relationship is subject to many factors that account for the characteristics of the firm and its entrepreneur, b) the formalization of informal M/SEs is subject to many factors that accounts for the alleviation of burdensome procedures, the provision of sound infrastructure and technology, and the reinforce of firms' human and financial capital, c) M/SEs' access to external source of finance (*i.e.* credits) is one of the best strategies inducing informal M/SEs to register and to increase productivity.

4. Data and summary statistics

The main purpose of our empirical analysis is to test the impact of informality on M/SEs' productivity and to highlight the relationship between informality, M/SEs' gender aspects and access to finance. The empirical analysis of this chapter is based on the 2003 M/SEs dataset collected by the Economic Research Forum (ERF).[11] This dataset presents a representative sample of 4958 private M/SEs selected from three major administrative regions in Egypt; Metropolitan region (47.74%), Lower Egypt region (17.83%) and Upper Egypt region (34.43%). M/SEs are then randomly selected from eight different governorates with different economic characteristics; Cairo (23.56%), Giza (18.11%), Alexandria (9%), Assiut (18.86%), Damietta (8.71%), Fayoum (4.32%), Souhag (8.29%), and Gharbiya (9.12%).[12]

In order to prevent any selection bias, the sample design is based on a multi-stage probability sample methodology. In the first stage, 120 primary sampling units (PSU) were randomly selected from each governorate based on the 1996 census. PSU represents Shiakha/Town in urban areas (84 towns) and villages in rural areas (36 villages). In the second stage, enterprises were classified into three categories according to M/SEs density (mean of M/SEs per building) and based on the

[11] OAMDI, 2013. Micro and Small Enterprises Survey (MSEs), http://www.erf.org.eg/cms.php?id=erfdataportal. Version 1.0 of Licensed Data Files; Egypt MSEs 2003. Egypt: Economic Research Forum (ERF).

[12] Figure 3.1 (appendix 3) shows the geographical distribution of these governorates.

listing of enterprises in each PSU. Then, PSU were divided into three equal groups; the lowest third, the medium third and the highest third. Finally in the third stage, a stratified random sample was selected from each category within PSU. Two strata were used based on male/female manager, with double weight for female to prevent their underrepresentation into the sample. Therefore, our sample is representative of the population of medium and small enterprises that was representing 99% of all establishment in 2010 (99% of firms are micro in our sample). The sample is also representative of the population of self-employed that was representing 38.9% of total employment is 2013 (37.6% of firms in our sample are self-employed).

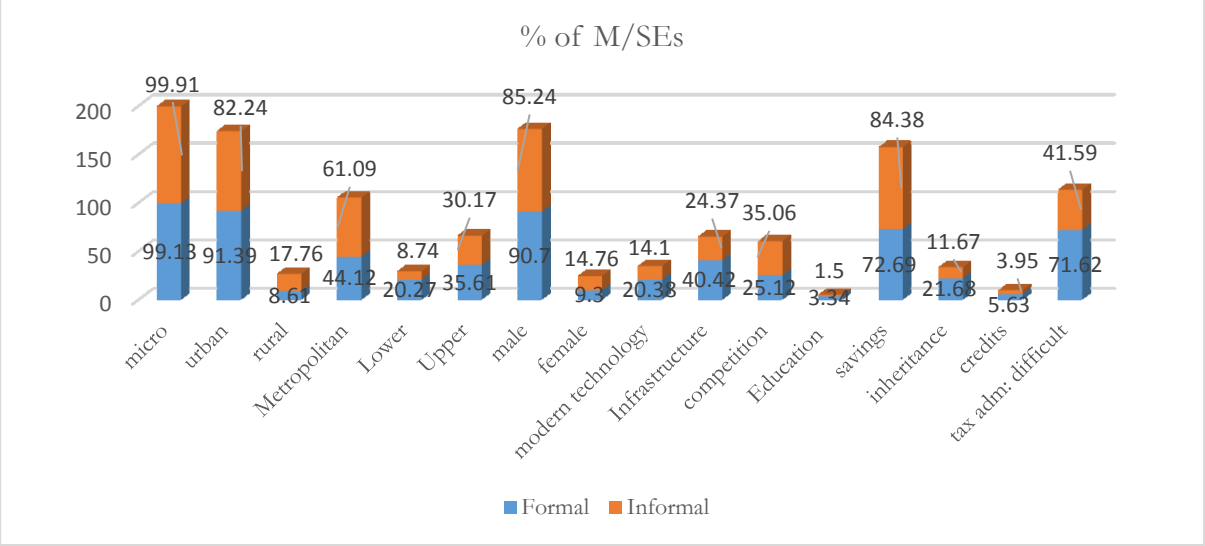
The survey is administrated to the owner or the manager of the firm and designed to provide information on the activities, manpower structure and financial characteristics of M/SEs. Most of surveyed M/SEs are micro firms (99%), from which 37.8% are self-employed and 76.9% are managed by a single owner (sole proprietorship). They primarily operate in the commercial sector (59%), followed by the service sector (30%) and the industrial manufacturing sector (11%). They are also more concentrated in urban zones of the metropolitan region (53.38%) in order to be closer to the population density. However, according to table 3.1 (appendix 3), only 37% of these M/SEs have access to basic infrastructures (water, electricity and roads) and only 19% have access to a moderate level of technology. Moreover, since only 5% of M/SEs have access to external source of finance (formal credits), M/SEs financial capital is mainly based on internal sources of finance such as the entrepreneurs' savings (75%) and his/her inheritance (19.5%). Most of external sources of finance are provided by banks (35%), by business associates (23%) and development funds (9.23%).

Since the majority of firms are micro and self-employed (99% and 37.6%), we cannot identify informal firms according to the size of the enterprise (as the first and second criteria of the CAPMAS definition). Thus, we identify them according to their registration status, which is a common determinant of informality included in the international definition of the informal sector presented by the International Labour Organization (ILO, 2002) and in the more restrictive definition given by the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS) (Abdelhamid & El-Mahdi, 2003). According to this criterion, a firm is considered formal if it is registered at the commercial registry. This step is preceded by the registration of the firm at the tax department and its acquisition of a tax card. That's why our dependent variable of interest is a dummy variable taking the value of one if the M/SE is registered at the tax department and acquired a tax card and zero otherwise.

Regarding M/SEs registration status, the proportion of formal M/SEs in the sample is higher than the proportion of informal ones (78.5% and 21.4% respectively). The proportion of formal firms is higher in urban zones and in Upper and Lower Egypt regions, while the proportion of informal firms is higher in rural zones of the metropolitan region. Yet, informal M/SEs are more concentrated in urban zones of the metropolitan areas where there are the highest levels of demand. Moreover, formal and informal M/SEs are equally divided between the different sectors of activities. There is slightly more informal M/SEs in the service sector and slightly more formal M/SEs in the manufacturing sector.

The comparison between formal and informal M/SEs, according to figure (1), confirms the advantages of operating formally. Registered (formal) M/SEs benefit from better and easier access to infrastructure, to technology, to credits; and offer higher salaries (+22%). However, unregistered (informal) firms face more competition from neighbouring firms engaged in the same type of activities, and their financial capital is mainly based on the owner's savings. The statistics also indicate the weaknesses of the entrepreneur's human capital. Both kind of firms have low level of formal education (3% technical or vocational) and rather run their businesses based on their own experiences in the field (30%). These precarious levels could have a negative effect on the overall performance of the firm, as well as on entrepreneur's ability to understand regulations (*i.e.* registration procedures and licensing) and the rule of law.

Figure 1. Formal and informal M/SEs characteristics



Source: author computation based on the 2003 M/SEs dataset collected by the Economic Research Forum (ERF)

As our explanatory variable of interest, M/SEs' registration status, is endogenous to the productivity of M/SEs, we instrument it using a discrete variable that reflects firms' perception

towards the severity of tax administration procedures.[13] This instrument takes the value of zero if the firm perceives the tax administration procedures as easy, one as moderate, and two as difficult (and three if the question is not applicable for a given firm). Our data show that informal M/SEs consider registration procedures as one of their main constraints, especially the severity of tax administration procedures that diminishes the incentive of enterprises to operate in the formal sector (Djankov et *al.*, 2004; De Soto, 1990). 65% of M/SEs perceive tax administration procedures as very difficult, from which 86% are formal M/SEs. As Egypt is a centralized country, the commercial laws (including tax law, registration law, etc.) is the same all over the country. Yet, the severity of tax administration procedures varies across the regions, the sectors of activity and the zones. As shown in figure 4.1 (appendix 4), tax administration procedures are more difficult in Lower Egypt comparing to the other regions, in the manufacturing sector comparing to the other sectors and in urban areas comparing to rural areas. Thereby, tax administration procedures are easier in Upper Egypt comparing to the other regions, and in the service sector comparing to other sectors.

Regarding M/SEs productivity, we measure it using a single factor productivity measure, labour productivity, which is computed as the ratio of monthly total sales revenues to total workers at the time of the interview.[14] Also, in order to validate our results we use a second measure of productivity which is firms' total factor productivity (TFP) that we compute using a standard Cobb Douglas function. According to table 3.1 (appendix 3), average M/SEs' monthly productivity is EGP 952 ($ 160) which corresponds to an average number of total workers of two (at the time of the interview and including male and female permanent, temporary and casual workers).

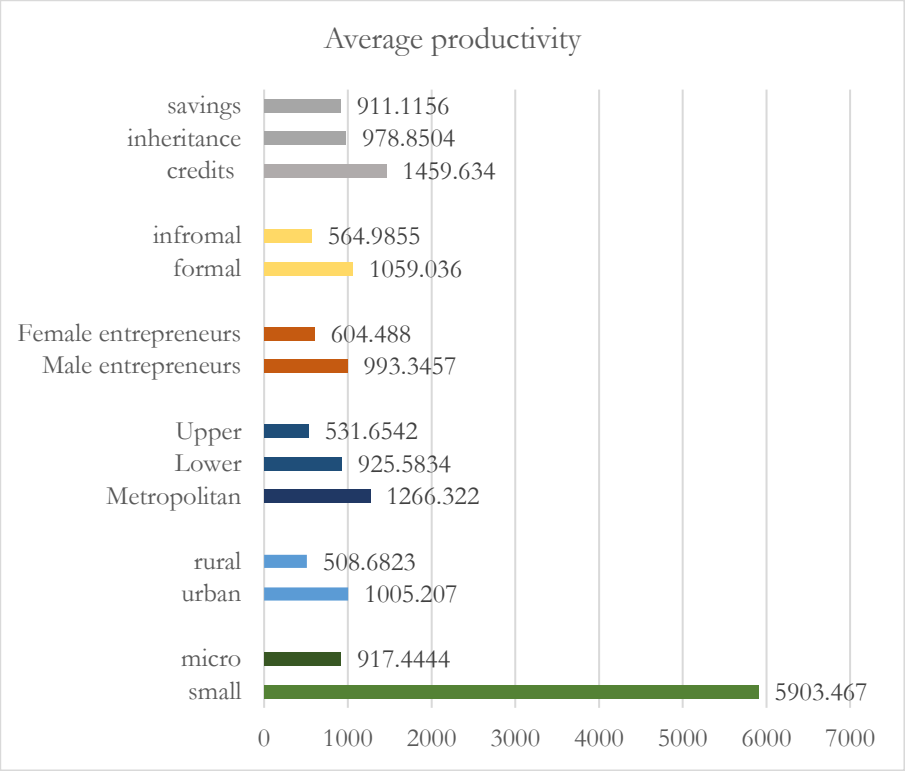
As shown in Figure (2) below, most productive firms are primarily located in urban zones of the metropolitan regions where there is better access to infrastructure and modern technology. Moreover, formal small M/SEs are more productive than informal micro M/SEs. The average productivity of small firms is 6.4 times that of micro firms. And the average productivity of formal firms is 1.6 times that of informal firms. Also, firms having access to credits or formal loans and owned by male entrepreneur report higher average productivity values, which confirms once more the importance of firms' access to external sources of finance and the severity of the business environment against female work.

---

[13] See section (5) for an explanation of the methodology used.

[14] Data collection began on April 1st, 2003 and was completed on May 15th, 2003. Most available information are monthly (at the time of the interview).

Figure 2. Average labour productivity by M/SEs' characteristics



Source: author computation based on the 2003 M/SEs dataset collected by the Economic Research Forum (ERF).

Regarding M/SEs characteristics, only 10.47% of firms are owned or managed by female entrepreneurs. This is primarily due to the barriers imposed against female work in Egypt as in many developing countries (ILO, 2002). According to our dataset, 68% of constraints on female' work come from family and 30% from the community. There is also a strong wage discrimination among M/SEs' entrepreneurs since male entrepreneurs earn 1.4 more than female entrepreneurs (this proportion is about 1.2 in the formal sector and 2.3 in the informal sector). However, most of female entrepreneurs operate formally (69.7% vs. 79.5% for male entrepreneurs) in commercial activities (80%) and are located in urban zones of the Metropolitan region (88%). But their share remains higher in informal activities.

5. Methodology

Our baseline regression estimates the effect of M/SEs' registration status on their productivity measured using a single factor productivity measure; labour productivity. As information on M/SEs' costs of materials are missing for 28% of the sample, we use total factor productivity (TFP) measure as robustness check. Our baseline regression takes the following form;

$$lnprod_i = \beta_0 + \beta_1 regis_i + \beta_2 Z_i + u_i \qquad \textbf{(eq.1)}$$

$$cov\,(Z,u) = 0, cov(regis,u) \neq 0$$

Where, $lnprod_i$ is the logarithm of M/SEs' monthly labour productivity measured as the ratio of monthly total sales revenues to total number of workers at the time of the interview, Z_i is the vector of firm-level variables that controls for the characteristics of the firm, its entrepreneur and its major constraints, and $regis_i$ is the endogenous independent variable of interest that equals one if the firm operates formally (registered at the tax department) and zero otherwise.

Yet, our baseline regression reveals an endogeneity bias ($cov(regis, u) \neq 0$) because of the causal relationship existing between M/SEs' productivity and informality. This bias is statistically confirmed by the rejection of the null hypothesis of the Durbin-Wu-Haussman's endogeneity test that confirms the necessity of adopting an instrumental variable approach. Hence, as shown in equation (2), we instrument our endogenous variable by the severity of tax administration procedures (tax_adm_i).

$$\widehat{regis}_i = \pi_0 + \pi_1 tax\_adm_i + v_i \qquad \textbf{(eq.2)}$$
$$cov\ (tax\_adm, v) = 0$$

Then, we include the estimated registration variable $\widehat{regis}_i$ in our baseline regression (equation 1)

$$lnprod_i = \beta_0 + \beta_1\ \widehat{regis}_i + \beta_2 Z_i + u_i \qquad \textbf{(eq.3)}$$
$$cov\ (Z, u_i) = 0, cov\ (\widehat{regis}_i, u_i) = 0$$

We expect a negative relationship between these two variables, because the higher is the severity of registration procedures, the lower is the willingness of M/SEs to register (De Soto, 1990; Djankov et al., 2004). According to the exclusion restriction condition of the instrumental variable approach, the severity of tax administration procedures should not have any direct effects on M/SEs' productivity other than those derived by its effect on M/SEs' registration probability ($cov\ (\widehat{regis}_i, u_i) = 0$). From a statistical point of view, table 5.1 (appendix 5) shows that the correlation between our instrument and the dependent variable is very low. Also, figure 5.1 (appendix 5) shows that M/SEs perception towards the severity of tax administration procedures is made independently of their productivity (in terms of TFP or labour productivity). Regardless the level of productivity (higher or lower than the median level), M/SEs follow more or less the same pattern among the different categories. Therefore, these statistical criteria make our instrument less exposed to criticism about its subjectivity.

From an economic point of view, this instrument depends on the individual perception of the entrepreneur which is an upstream perception that is exogenous to the functioning process of the firm and its productivity, especially for informal firms which have never applied any of these

procedures. In addition, the registration of the firm at the tax department is carried out at the creation of the firm. Therefore, even if we assume that there is a direct effect between the severity of tax administration procedures and the productivity of the firm, this effect would be significant only at the date of creation of the firm and not on the long term.

Furthermore, we replicate the above steps to emphasize the gender aspect of M/SEs. We try to identify to what extent the effect of M/SEs' registration on their labour productivity will vary according to the owner's gender. Thus, we modify equations (2) and (3) as follows;

$$\widehat{regis}_i = \sigma_0 + \sigma_1 tax\_adm_i + \sigma_2 gender_i + \varepsilon_i \quad \textbf{(eq.4)}$$

$$lnprod_i = \theta_0 + \theta_1 \widehat{regis}_i + \theta_2 gender_i + \theta_3 Z_i + \epsilon_i \quad \textbf{(eq.5)}$$

Where, $gender_i$ is a dummy variable taking the value of one if the firm's owner is a male and the value of zero if the firm's owner is a female.

Also, in order to identify the best intervention strategy that induces M/SEs to formalize (third hypothesis), we investigate to what extent M/SEs' access to external and internal sources of finance affect differently the probability of M/SEs' registration and productivity (equations 6 & 7). Then, we identify the relationship between M/SEs' registration, external and internal sources of finance by testing the impact of M/SEs' registration on the probability of access to external sources of finance (equation 8).

$$\widehat{regis}_i = \pi_0 + \pi_1 tax\_adm_i + \pi_2 initial_i + v_i \quad \textbf{(eq.6)}$$

$$lnprod_i = \beta_0 + \beta_1 \widehat{regis}_i + \beta_2 initial_i + \beta_3 Z_i + u_i \quad \textbf{(eq.7)}$$

$$Credit_i = \emptyset_0 + \emptyset_1 \widehat{regis}_i + \emptyset_2 internal_i + \emptyset_3 Z_i + u_i \quad \textbf{(eq.8)}$$

Where, $initial_i$ is a discrete variable taking the value of zero if the source of initial capital is based on the owner's savings, one if it's based on inheritance and two if it's based on credits; $Credit_i$ is dummy variable taking the value of one if the M/SE got a line of credit during the last 12 months, and zero otherwise; and $internal_i$ is a dummy variable taking the value of one if the M/SE's initial source of capital is based on internal source of finance (inheritance or/& savings or/& own remittance or/& liquidation of assets) and zero otherwise.

Practically, we estimate equations (2), (4), and (6), using an instrumental variable estimation (ivreg) that does not account for the binary effect of the endogenous variable ($regis_i$). As explained by (Heckman & Robb, 1985), the consistency of IV-2SLS estimation does not require the endogenous variables to be continuous. Also, using the logit/probit model in the first stage is unnecessary since in 2SLS estimation, the consistency of the estimates in the second stage are not dependent on the

correct functional form in the first stage. However, in order to validate our results we also estimate these equations using 2SLS estimations that estimate the predicted value of the endogenous variable ($regis_i$) using a probit regression that accounts for the instrument tax_adm_i and the other explanatory variables.

6. Empirical results and discussion

6.1 Informality and productivity of M/SEs

As expected, the results of the first stage regression (table 1, column 1) show that the probability of M/SEs' registration is negatively affected by its instrument (severity of tax administration procedures). This negative effect is highly significant and remains robust to other specifications (table 6.1 - appendix 6). Increasing the severity of tax administration procedures typically reduces the probability of M/SEs registration, which mirrors the imperfection and complexity of the institutional system in Egypt (World Bank, 2014). The second stage regression (table 1, column 2) indicates that M/SEs' monthly labour productivity increases significantly by 71 percentage points when they operates formally. This positive effect remains valid when splitting the regression to male and female entrepreneurs (columns 3 & 4). In addition, as reported in table 7.1 (appendix 7), our regression reports a stronger positive effect when using TFP measure instead of labour productivity measure. Similarly, as reported in appendix (8) (table 8.1, columns 1 & 2), this positive effect remains valid when applying a 2SLS estimation that accounts for the binary effect of the endogenous variable (use of a probit estimation in the first step equation).

Nevertheless, this reported effect is subject to the impact of other explanatory variables included in our regressions. First of all, the gender aspect of M/SEs is an important factor that must be taken into consideration when addressing M/SEs in Egypt (El-Mahdi, 2006). Comparing to female entrepreneurs, we can first remark that being a male entrepreneurs increases the M/SE's monthly labour productivity by 24 percentage points (table 1, column 2). Then, splitting our estimation by gender (columns 3 & 4), we can realize that female entrepreneurs operating formally outperform their male counterparts (15% gap). This result is in line with the findings of El-Hamidi & Baslevent (2010) and El-Hamidi (2011) who proved that female entrepreneur could be better performing comparing to male entrepreneurs but they generate less profits and revenues because of the barriers imposed by the market and the society. Our findings add that the performance of female entrepreneurs could be even more enhanced if they are running their firms on formal basis.

Besides the gender of the entrepreneur, his/her human capital plays an important role in taking rational decisions and creating a secured capital and business (Meyer, 2000; World Bank, 2014). In contrast to the effect of formal education, the probability of registration of the M/SE increases

significantly when the entrepreneur receives training or/& experience related to his/her present activity (table 1, column 1). The insignificant effect of both variables on M/SEs' productivity (table 1, column 2) is driven by the poor provision of training programs as well as the imperfection of the education system in Egypt that pushes entrepreneurs to build their businesses based on their own experience in the field rather than formal education.

According to Mincer (1975)'s human capital theory, the entrepreneur's revenues increase through his/her lifecycle at a diminishing rate and start to decrease when s/he gets older and when net investments in human capital become negative. Our results are in line with this theory since the entrepreneur's age has a negative effect on the firm's productivity. Though, age has a positive effect on the probability of registration of the firm since the experience acquired by the entrepreneur through years allows him/her to consider the advantages of operating formally and the importance of leaving a secured business to his/her inherited generation. M/SEs' owner characteristics call on the importance of the "one man show" notion as the majority favours self-employment (Abdelhamid & El-Mahdi, 2003). That's why having business partners has a significant negative effect on the productivity of M/SEs (-17% points). Yet, partnership may increase significantly the probability of registration of the firm because it provides stronger initial capital for the firm to cover licensing and registration's costs.

The location of M/SEs is captured by accounting for the zone (rural or urban) and the region (Metropolitan, Upper and Lower Egypt) in which the firm operates. Comparing to rural zones and the metropolitan region, the probability of registration is higher for firms located in urban zones of Upper or Lower Egypt regions. However, the productivity of firms is not differently affected when locating the firm in urban or rural zones, and in Metropolitan or Lower Egypt regions. M/SEs' productivity is significantly lowered in Lower Egypt region comparing to the Metropolitan region, especially due to the poor provision of services in these areas (basic infrastructure, technology, materials, etc.).

Concerning M/SEs constraints in terms of access to infrastructure and technology, and the severity of competition, our results indicate that the access to a moderate level of technology has a significant positive effect on the probability of M/SEs' registration and on their productivity. In addition, the stronger is the competition intensity against M/SEs, the lower is their ability to register, but the higher is their productivity. Although the importance of firms' access to infrastructure in creating a stable business, this variable does not report a significant effect on firms' productivity, which may be due again to the poor provision of infrastructure and services to

businesses in Egypt. Actually, there is a vicious cycle between these constraints. The better is firms' access to technology, the stronger is their ability to innovate. As a result, productivity and competition increase.

Lastly, reported results are in line with our defined hypotheses. The positive effect that registration has on M/SEs productivity is subject to the alleviation of registration procedures, the provision of sound infrastructure and technology, and the reinforcement of the firm's human capital as well as its financial capital as emphasized in the next section.

Table 1. Registration and M/SEs' productivity- Instrumental variable estimation

	IV estimation		IV estimation - Second stage	
	First stage	Second stage (baseline regression)	Male	Female
	(1)	(2)	(3)	(4)
Tax_adm_i	-0.115***			
	(0.00730)			
$\widehat{regis}_i$		0.712***	0.722***	0.829**
		(0.186)	(0.210)	(0.375)
$Gender_i$	0.0681***	0.242***		
	(0.0181)	(0.0499)		
$Education_i$	0.0457	0.0913	0.0857	0.138
	(0.0321)	(0.0977)	(0.0990)	(0.464)
$Training\ \&\ exp_i$	0.0297**	0.0441	0.0441	-0.107
	(0.0124)	(0.0352)	(0.0365)	(0.140)
Age_i	0.000912**	-0.00326***	-0.00347***	-0.00252
	(0.000411)	(0.00116)	(0.00129)	(0.00320)
$Partners_i$	0.0593***	-0.173***	-0.173***	-0.249
	(0.0134)	(0.0410)	(0.0429)	(0.154)
$Urban_i$	0.197***	-0.0722	-0.0636	-0.164
	(0.0192)	(0.0645)	(0.0701)	(0.161)
$Region_i$ *(ref. Metropolitan)*				
$Upper\ Egypt_i$	0.182***	-0.0775	-0.0416	-0.452***
	(0.0159)	(0.0585)	(0.0626)	(0.174)
$Lower\ Egypt_i$	0.0979***	-0.461***	-0.465***	-0.396***
	(0.0136)	(0.0448)	(0.0475)	(0.139)
$Infrastructure_i$	0.0967***	0.00656	0.0190	-0.122
	(0.0117)	(0.0364)	(0.0381)	(0.115)
$Technology_i$	0.0392***	0.308***	0.324***	0.195
	(0.0145)	(0.0427)	(0.0455)	(0.121)
$Competition_i$	-0.0678***	0.279***	0.301***	0.00752
	(0.0127)	(0.0393)	(0.0424)	(0.113)
$Initial_i$ *(ref. savings)*				
$Inheritance_i$	0.0797***	0.00322	0.0178	-0.191
	(0.0141)	(0.0406)	(0.0432)	(0.126)
$Credits_i$	0.0191	0.228***	0.230***	0.164
	(0.0249)	(0.0724)	(0.0769)	(0.222)
Constant	0.594***	5.484***	5.697***	5.701***
	(0.0364)	(0.101)	(0.113)	(0.242)
Observations	4,716	4,716	4,219	497
R-squared	0.153	0.065	0.065	0.005

F-test of first stage	60.69 {0.0000}	52.74 {0.0000}	11.64 {0.0000}

Notes: in column (1), the dependent variable is a dummy variable taking the value of one if the M/SE acquired a tax card at start-up of the activity by registering at the tax department, and zero otherwise. In columns (2-4), the dependent variable is the logarithm of M/SEs' monthly labour productivity. All monetary variables are in Egyptian pounds. $\widehat{regis}_i$ is the predicted variable of registration instrumented using the severity of tax administration procedures Tax_adm_i. List of variables is provided in table 3.1 (appendix 3). F-test of first stage is the test statistic of the significance of the instrument in the first-stage regressions, with p-values in braces. Robust standard errors are reported between brackets. *** Significant at 1 %. ** Significant at 5%. * Significant at 10%.

6.2 External source of finance and tax formalities

Many papers argued the importance of the financial capital for the survival of M/SEs (Abdelhamid & El-Mahdi, 2003; El-Mahdi & Ossman, 2003). That's why we account for it in our baseline regression through the variable $Initial_i$ that shows whether firms' initial capital is based on savings, inheritance or formal credits. The first two reflect the firm's access to internal source of finance and the last reflects the firm's access to external source of finance. Table 1 (columns 1 & 2) shows that although inheritance is the only source of initial capital that increases significantly the probability of M/SEs' registration, it has not a significant effect on M/SEs' productivity. However, formal credits are the only source of initial capital that increases significantly the productivity of M/SEs (+22.8% points). Yet, only 5.26% of surveyed M/SEs have access to credits in our sample.

In order to test the relationship between registration (tax formalities) and external sources of finance from one hand and between external and internal sources of finance from the other hand, we replicate our instrumental variable estimation by using the variable "credit" as dependent variable.[15] As shown in table (2) (column 2), tax formalities ($\widehat{regis}_i$) increase significantly the probability of access to credits. However, internal sources of finance (savings and inheritance) tend to affect negatively and significantly the probability of access to credits. This result proves the existence of a complementarity relationship between tax formalities (*i.e.* registration at tax department and payment of taxes) and the access to external source of finance (*i.e.* formal credits), which indicates that tax formalities are a necessary condition to ensure M/SEs' easier access to external source of finance. It also proves that internal and external sources of finance act as substitutes. According to appendix (8) (columns 3 & 4), these results remain valid when applying a 2SLS estimation that accounts for the binary effect of the endogenous variable (use of a probit estimation as first step equation).

[15] Doing so does not violate the exclusion restriction condition because the decision of firms' access to external source of finance is exogenous to the firm and mainly depends on the creditors' conditions.

In conclusion, our results call on the importance of firms' access to different sources of finance to induce the formalization process. We provide evidence that costs associated with formalization are initially based on the entrepreneur's internal sources (such as inheritance and savings). Once formalized, the entrepreneur has easier access to external source of finance that s/he uses instead of internal ones, enabling him/her to extend his/her activity in the formal sector. Yet, according to our first result (section 6.1), firms' registration is subject to the alleviation of registration procedures and the reinforcement of the firm's human capital.

Table 2. M/SEs productivity and access to internal and external sources of finance

	IV estimation - 2nd stage	
	Baseline regression	Dependent variable Initial capital based on formal credits
	(1)	(2)
$\widehat{regis}_i$	0.712***	0.0910**
	(0.186)	(0.0356)
$Internal_i$		-0.478***
		(0.0220)
$Initial_i$ *(ref. savings)*		
$Inheritance_i$	0.00322	
	(0.0406)	
$Credits_i$	0.228***	
	(0.0724)	
$Gender_i$	0.242***	0.00447
	(0.0499)	(0.00951)
$Education_i$	0.0913	0.00341
	(0.0977)	(0.0181)
$Training\ \&\ exp_i$	0.0441	-0.00347
	(0.0352)	(0.00569)
Age_i	-0.00326***	6.31e-05
	(0.00116)	(0.000173)
$Partners_i$	-0.173***	0.00269
	(0.0410)	(0.00730)
$Urban_i$	-0.0722	-0.0150
	(0.0645)	(0.0126)
$Region_i$ *(ref. Metropolitan)*		
$Upper\ Egypt_i$	-0.0775	-0.0208**
	(0.0585)	(0.00989)
$Lower\ Egypt_i$	-0.461***	-0.00776
	(0.0448)	(0.00831)
$Infrastructure_i$	0.00656	-0.00552
	(0.0364)	(0.00652)
$Technology_i$	0.308***	-0.00432
	(0.0427)	(0.00687)
$Competition_i$	0.279***	0.0166***
	(0.0393)	(0.00637)
Constant	5.484***	0.420***
	(0.101)	(0.0281)
Observations	4,716	4,845
R-squared	0.065	0.420

F-test of first stage	64.21 {0.0000}

Notes: in column (1), the dependent variable is the logarithm of M/SEs' monthly labour productivity. All monetary variables are in Egyptian pounds. In column (2), the dependent variable is a dummy variable taking the value of one if M/SE's initial capital is based on formal credits, and zero otherwise. $\widehat{regis}_i$ is the predicted variable of registration instrumented using the severity of tax administration procedures as an instrument Tax_adm_i. List of variables is provided in table 3.1 (appendix 3). F-test of first stage is the test statistic of the significance of the instrument in the first-stage regressions, with p-values in braces. Robust standard errors are reported in brackets *** Significant at 1 %. ** Significant at 5%. * Significant at 10%.

7. Conclusion

This chapter empirically identifies the extent to which the productivity of micro and small enterprises (M/SEs) in Egypt is affected by operating informally as well as the channel through which this effect is driven. Our model puts forward the importance of firm's financial capital by testing the relationship between firms' external and internal sources of finance. It also indicates the productivity gap between male and female entrepreneurs.

Our results prove that operating informally reduces significantly the labour productivity of M/SEs in Egypt. Hence, ignoring the informality issue by the government would never be the solution. The introduction of effective polices is indispensable to encourage informal M/SEs to formalize. According to our results, these policies must start by alleviating registration and taxation costs and procedures. Then, they must be followed by other strategies that allow the entrepreneurs to realize the benefits of formality, especially those of paying taxes. Such strategies should target essentially M/SEs access to credits, technology and trainings as effective tools inducing M/SEs' registration.

With more available data our estimation could be extended to a more representative sample including all types of enterprises (in terms of size and activities) which might control for the selection bias existing in our results. However, this bias is hindered, first, by our attempt to test the relationship between two important economic factors in Egypt; M/SE considered as the core of the economic system and the growth of informality. Second, by our empirical analysis that uses the only available dataset on M/SEs in Egypt and that allows us to account for the specificity of these firms.

In addition, our results open the path towards the implementation of more empirical attempts testing the relationship between firm-level performance and informality. These researches might opt for a panel estimation (see World Bank Enterprise surveys) to introduce more dynamics and to emphasize the evolution of the effect of informality. Moreover, a randomized experience could be effective in identifying the best strategy inducing the formalization process.

References

Abdelhamid, D., & El-Mahdi, A. (2003). The small business informality challenge: lessons learned from country experiences and the road ahead of Egypt. (ERF Working Paper No. 0324). Cairo, Egypt: Economic Research Forum.

African Development Bank (2006). *Social fund for development: micro and small enterprises support project report (Appraisal Report)*. Abidjan, Côte d'Ivoire: African Development Bank Group

Assaad, R. (2002, October). Informalization and de-feminization: Explaining the unusual pattern in Egypt. Paper presented at the conference on Rethinking Labor Market Informalization: Precarious Jobs, Poverty, and Social Protection, Cornell University, Ithaca, NY, October (pp. 18-19). Paper retrieved from http://wwwhhh.oit.umn.edu/people/rassaad/pdf/informalization.pdf

Assaad, R.(Ed.). (2002). *The Egyptian Labor Market in an Era of Revolution*. Oxford, UK: Oxford University press. An Economic Research Forum Edition. Cairo, Egypt: The American University in Cairo Press.

Attia, S. M. (2009). The informal Economy as an engine for poverty reduction and development in Egypt. (MPRA Working Paper No.13034). Munich, Germany: Munich Personal RePEc Archive.

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2008). How important are financing constraints? The role of finance in the business environment. *The World Bank Economic Review*, *22*(3), 483-516.

Beck, T., & Demirguc-Kunt, A. (2006) Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking and Finance*, *30*(11), 2931-2943.

Beck, T., Demirguc-Kunt, A., & Levine, R. (2005). SMEs, growth, and poverty: cross-country evidence. *Journal of economic growth*, *10*(3), 199-229.

Beck, T., Demirguc-Kunt, A., & Maksimovic, V. (2008) Financing patterns around the world: Are small firms different?, *Journal of Financial Economics, 89*(3), 467-487.

Charmes, J. (1990). A critical review of concepts, definitions and studies in the informal sector. In Turnham, D., Salome, B., & Schwarz, S. (Eds.), *The informal sector revisite*d, (pp.10–49). Paris, France: OECD.

Cull, R., & Xu, L. C. (2005) Institutions, ownership, and finance: The determinants of profit reinvestment among Chinese firms*, Journal of Financial Economics, 77*(1), 117-146.

De Soto, H. (1990). *The other path: The invisible revolution in the third world.* New York: Harper and Row.

Dessy, S., & Pallage, S. (2001). Taxes, Inequality and the Size of the Informal Sector, *Journal of Development Economics*, *70*(1), 225-233.

Djankov, S., Miguel, E., Qian, Y., Roland, G., & Zhuravskaya, E. (2004). Who are Russia's entrepreneurs?, *Journal of the European Economic Association, 3*(2-3), 1-11.

Doing Business, The World Bank (http://www.doingbusiness.org)

Elbadawi, I., & Loayza, N. (2008). Informality, employment and economic development in the Arab world. *Journal of Development and Economic Policies*, *10*(2), 25-75.

El-Fattah, M. A. A. (2012). A survey-based exploration of satisfaction and profitability in Egypt's informal sector. (ECES Working Paper No. 169) Cairo, Egypt: Egyptian Center for Economic Studies.

El-Hamidi, F. (2011). How do women entrepreneurs perform? Empirical evidence from Egypt. (ERF Working Paper No. 621). Cairo, Egypt: Economic Research Forum.

El-Hamidi, F., Baslevent C. (2010). The gendered aspects of MSES in MENA: Evidence from Egypt and Turkey. (ERF Working Paper No. 535). Cairo, Egypt: Economic Research Forum.

El-Mahdi, A. (2000). The labor absorption capacity of the informal sector in Egypt. Minneapolis: Minnesota Population Center, University of Minnesota.

El-Mahdi A. (2006). *MSEs Potentials and Success Determinants in Egypt 2003-2004, Special Reference to Gender Differentials* (ERF Policy research report No. 0418). Cairo, Egypt: Economic Research Forum.

El-Mahdi A. (2010). Poverty and informality: a restraining or constructive relationship?, (ERF Working Paper No. 569). Cairo, Egypt: Economic Research Forum.

El-Mahdi, A., Osman, M. (2003). *An assessment of the effectiveness of small and micro-enterprises finance in employment creation* (ERF Policy research report No. 0313). Cairo, Egypt: Economic Research Forum.

Galal, A. (2004). The economics of formalization: Potential winners and losers from formalization in Egypt. (ECES Working Paper No. 95). Cairo, Egypt: Egyptian Center for Economic Studies.

Gardes, F., Starzec, C. (2001). Polish households between transition and informal markets. (CERGE-EI discussion paper series No.72). Prague, Czech Republic: CERGE-EI.

Hart, K. (1973). Informal Income Opportunities and Urban Employment in Ghana*, Journal of Modern African Studies, 11*(1), 61-89.

Heckman, J. J., & Robb Jr, R. (1985). Alternative methods for evaluating the impact of interventions: An overview. Journal of Econometrics, 30(1), 239-267.

Hendy, R., & Zaki, C. (2013). On informality and productivity of micro and small enterprises: Evidence from MENA countries. *International Journal of Entrepreneurship and Small Business*, *19*(4), 438-470.

International Labour Organisation. (2002). *Travail décent et économie informelle, Conférence internationale du travail, 90ème session*. Geneva, Switzerland: International Labour Office.

Jütting, J. (2009). *Is informal normal?: towards more and better jobs in developing countries*. Jütting, J. &. De Laiglesia, J. R. (Eds.). Paris, France: Development Centre of the Organisation for Economic Co-operation and Development.

Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper No. 5430 (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130)

Meyer, G. (2000). Survival of small-scale manufacturing in Cairo during structural adjustment results from a long-term study. (CERAW working paper No.2021). Mainz, Germany: Center for Research on the Arab World.

Mincer, J. (1975). Education, Experience, and the Distribution of Earnings and Employment: An Overview. (*NBER* discussion paper series No. 3693). Cambridge, Massachusetts, USA: National Bureau of Economic Research

Ministry of Foreign Trade (2003). *Profile of M/SMEs in Egypt*. Cairo, Egypt: Ministry of Foreign Trade.

Nasr, S. (2010). *Egypt, Arab Republic of Egypt- Enhancing Access to Finance for Micro and Small Enterprises* (Implementation Status Results Report, Sequence 01). Washington, DC: the World Bank.

OAMDI, 2013. Micro and Small Enterprises Survey (MSEs), http://www.erf.org.eg/cms.php?id=erfdataportal. Version 1.0 of Licensed Data Files; Egypt MSEs 2003. Egypt: Economic Research Forum (ERF).

Rashed, A., & Sieverding, M. (2015). Micro and small household enterprises in Egypt: Potential for growth and employment generation. In Assaad, R., & Krafft, C. (Eds.). *The Egyptian Labor Market in an Era of Revolution* (pp. 182-197). Oxford, UK: Oxford University press.

Schneider, F., Buehn, A., & Montenegro, C. E. (2010). Shadow Economies all over the World: New Estimates for 162 Countries from 1999 to 2007. (Policy Research Working Paper Series No. 5356). Washington, DC: The World Bank.

Wahba, J. (2009). Informality in Egypt: a stepping stone or dead end?, (ERF Working Paper No. 456). Cairo, Egypt: Economic Research Forum.

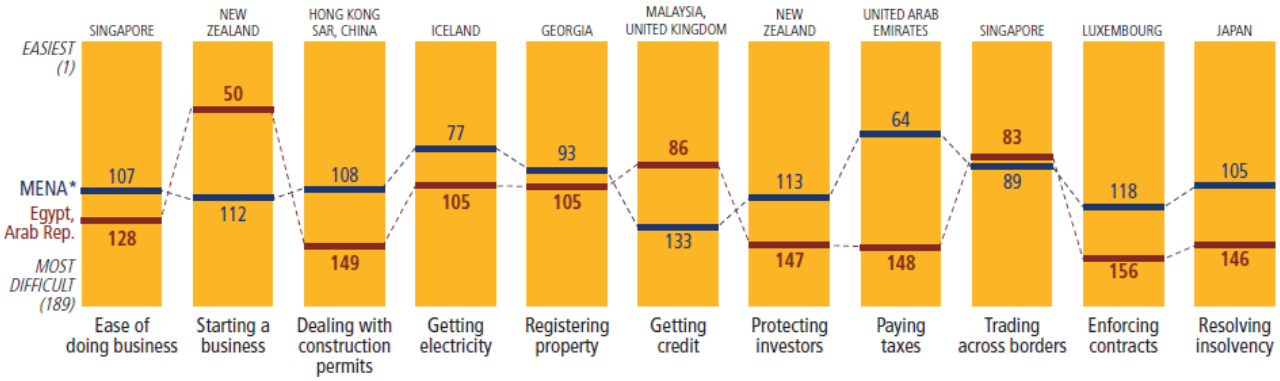
World Bank (2014). *Doing Business report in Egypt: Understanding Regulations for Small and Medium-Size Enterprises.* Washington, DC: World Bank.

World Development Indicators. Washington, DC: World Bank.

Appendices

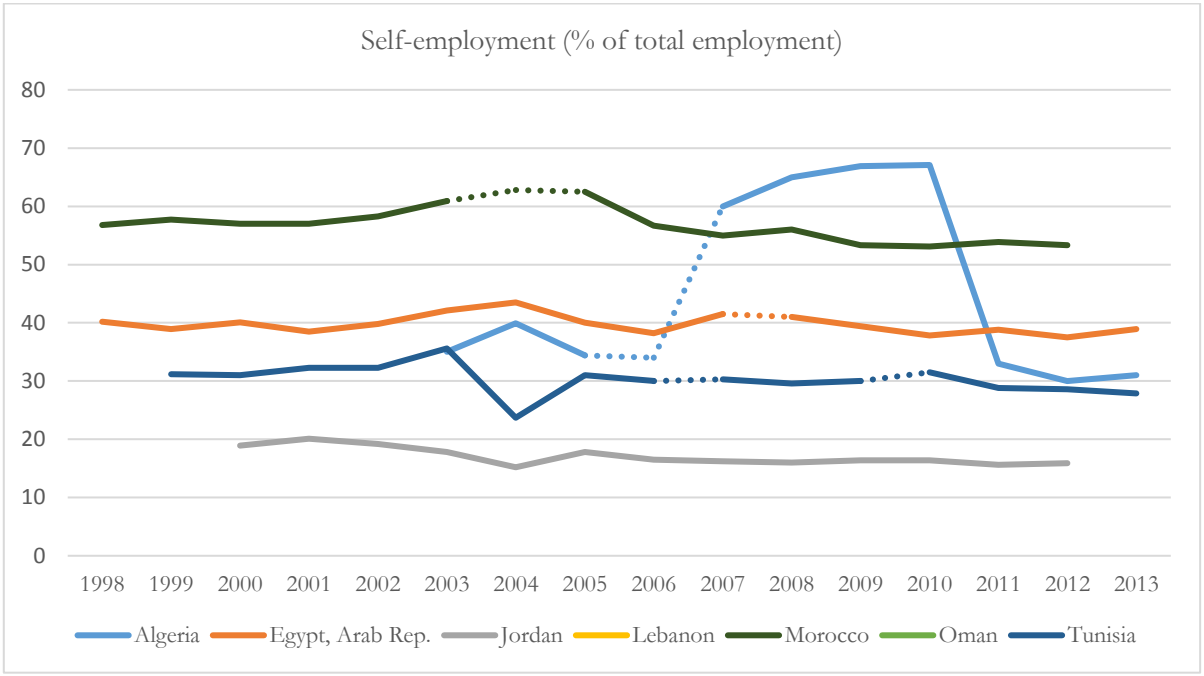
Appendix 1 Main economic characteristics of MENA countries

Figure 1.1. Ease of doing business indicators in Egypt



Notes: Egypt and other economies are represented by their largest business city and their rankings are based on Doing Business 2014: Understanding Regulation for small and medium-Size Enterprises. Source: Doing Business database.

Figure 1.2 Share of Self-employment in Egypt and other MENA countries



Notes: lines in dotes are missing data. Source: Graph computed by the author using the World Development Indicators

Table 1.1 Other important characteristics in the MENA region

Country	Self-employed (%)			Informal employment (% of total non-agricultural employment)	Informal economy (% of GDP)	Youth unemployment, (% of total labour force ages 15-24)	Unemployment, total (% of total labour force)	GDP growth (%)	Poverty headcount ratio (% of population)	Ease of doing business index	Control of Corruption	Regulatory Quality
	Total	Male	Female									
	(1)			(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Algeria	27.5 (2014)	28.8 (2014)	21 (2014)	37.7 (2012)	34.3	25.3 (2014)	10.6 (2014)	3.2	5.5 (2011)	156	-0.68	-1.16
Egypt	38.9 (2013)	36.6 (2013)	48.2 (2013)	49.6 (2012)	34.9	34.3 (2013)	13.2 (2013)	4.3	25.2 (2010)	122	-0.55	-0.79
Jordan	15.9 (2012)	18.2 (2012)	3.9 (2012)	-	18.5	29.3 (2012)	12.6 (2013)	4.8	14.4 (2010)	118	0.25	0.04
Lebanon	37.3 (2007)	43.8 (2007)	17.6 (2007)	**51.8 (2000/2007)**	33.1	22.1 (2007)	9 (2007)	4.47	27.4 (2012)	126	-0.87	-0.27
Morocco	56 (2008)	52.4 (2008)	65.9 (2008)	71.5 (2012)	34.9	20 (2014)	9.9 (2014)	4.3	8.9 (2007)	68	-0.24	-0.17
Oman	3.5 (2010)	3.3 (2010)	4.1 (2010)	-	18.4	-	**7.2 (2014)**	4.74	-	66	0.2	0.58
Tunisia	28.6 (2012)	31.4 (2012)	19.8 (2012)	33.9 (2012)	37.2	37.6 (2012)	15.9 (2013)	3.19	15.5 (2010)	77	-0.11	-0.39
United Arab Emirates	4.4 (2009)	5.1 (2009)	1.4 (2009)	-	25.9	12.1 (2008)	4.2 (2009)	3.72	-	26	1.12	1.13
Yemen	34.1 (2010)	33.4 (2010)	42.2 (2010)	**51.1 (2000/2007)**	27.1	33.7 (2010)	17.8 (2010)	-0.58	34.8 (2005)	179	-1.44	-1.1

Notes: column (1) presents the percentage of self-employment in total employment by gender. Column (2) presents the percentage of informal employment in total non-agricultural employment for the last available year (between brackets). Data are from Charmes (2012) and data in bold are from Jütting (2009). Column (3) presents the percentage of informal economy in official GDP (period average 1999-2007). Data are from Schneider et *al.* (2010). Column (4) presents the national estimates of the share of youth unemployment in total labour force (ages 15-24) for the last available year (between brackets). Column (5) presents the national estimates (modelled ILO estimate in bold) of the share of total unemployment in total labour force for the last available year (between brackets). Column (6) presents the average percentage of annual GDP growth for the period 2005-2015. Column (7) presents the poverty headcount ratio at national poverty lines in percentage of population for the last available year (between brackets). Column (8) presents the 2016's ease of doing business index (1=most business-friendly regulations). Data in columns (1, 4-8) are from the World Development Indicators. Columns (9 & 10) present the 2015's control of corruption and regulatory quality estimates (-2.5 to 2.5). Data are from the World Governance indicators (Kaufmann et al., 2010). Table is computed by the author.

Appendix 2 Formal and informal micro, small and medium enterprises in Egypt

Table 2.1. Formal and informal firms by gender and size

Size of the enterprises (by number of workers)	Formal						Informal					
	Male		Female		Total		Male		Female			Total
	%	number	%	number	%	number	%	number	%	number	%	number
0 to 4	2	95428	2.7	43956	2.1	134387	60.5	1763777	54.3	263499	60	2040360
5 to 9	5.6	267198	5.5	89540	5.6	358366	20.5	597644	13.9	67452	19.8	673319
10 to 29	15.7	749109	17.9	291413	16	1023904	8.4	244888	12.6	61143	8.8	299253
30 to 49	10.7	510539	12.6	205129	11	703934	1.9	55391	4.3	20866	2.24	76258
50+	61.1	2915321	53.7	674240	60.1	3846039	4.9	142851	13.6	65996	5.7	193834
Not specified	4.9	233798	7.5	122101	5.2	332769	3.8	110783	1.4	6794	3.6	122422
Total	100	4771393	100	1626379	100	6399399	100	2915334	100	485750	100	3405446

Source: Assaad (2002), based on the Egyptian Labour Market Survey (ELMS 1998) and the 1988 Labour Force Sample Survey (LFSS 1988).

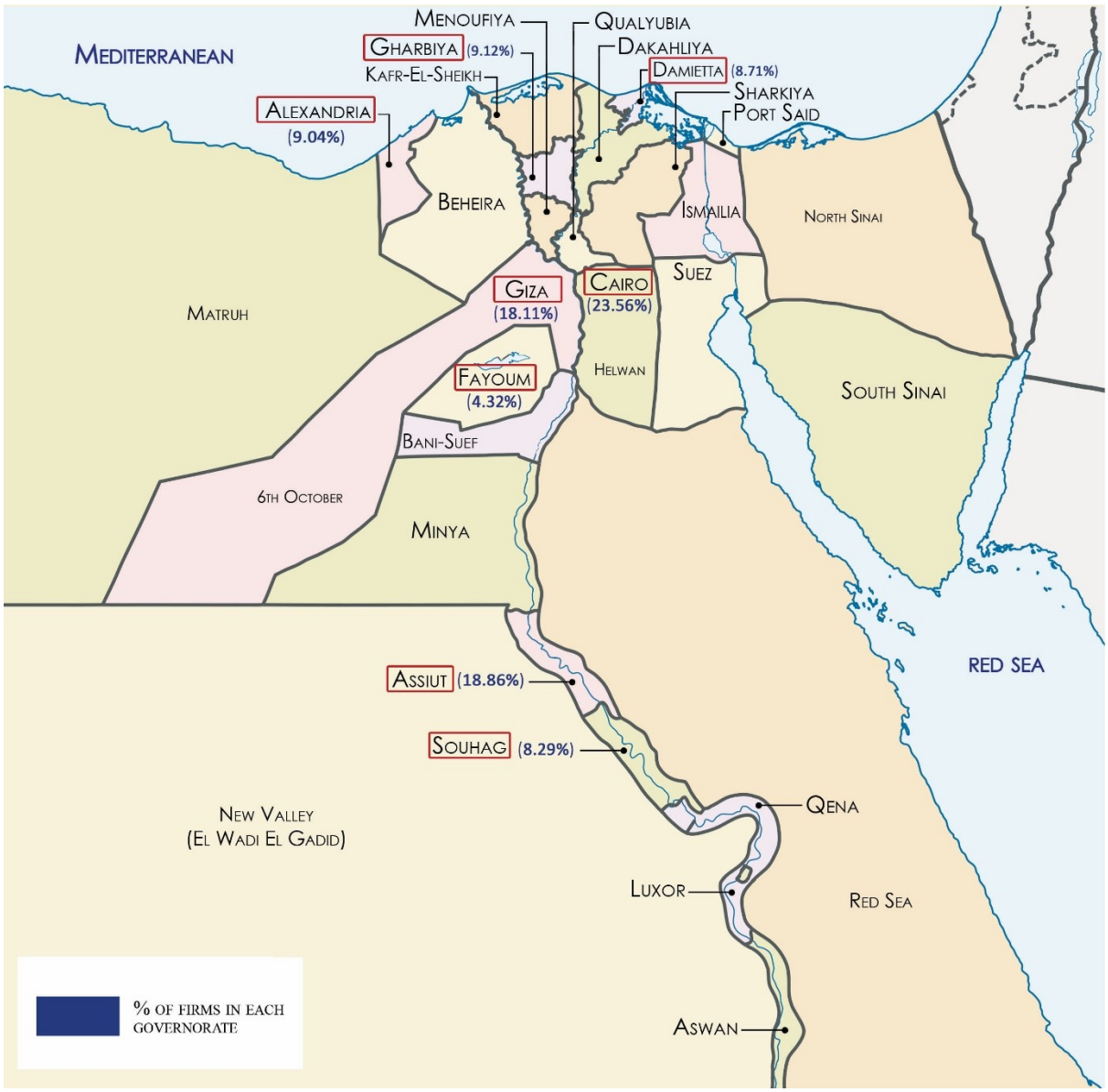
Table 2.2. Formal and informal firms by gender and economic activity

Economic Activity	Formal			Informal		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
Mining	0.23	0	0.2	0.03	0	0.03
Manufacturing	20.2	2.97	18.05	19.84	15.8	19.04
Electricity	0.23	2.46	0.51	0.57	0	0.45
Construction	2.03	0	1.78	5.92	0	4.76
Trade	59.6	22.85	55.01	35.56	49.59	38.32
Transport	2.8	2.97	2.82	5.93	0.34	4.83
Finance	3.93	5.48	4.12	2.12	0.65	1.83
Services	10.98	63.27	17.05	30.03	33.62	30.7
Total	100	100	99.54	100	100	100

Source: Assaad (2002), based on the Egyptian Labour Market Survey (ELMS 1998) and the 1988 Labour Force Sample Survey (LFSS 1988).

Appendix 3 Summary statistics of the 2003 M/SEs dataset

Figure 3.1. Governorates included in the sample



Source: author computation based on the 2003 M/SEs dataset collected by the Economic Research Forum (ERF)

Table 3.1. List of variables included in the analysis

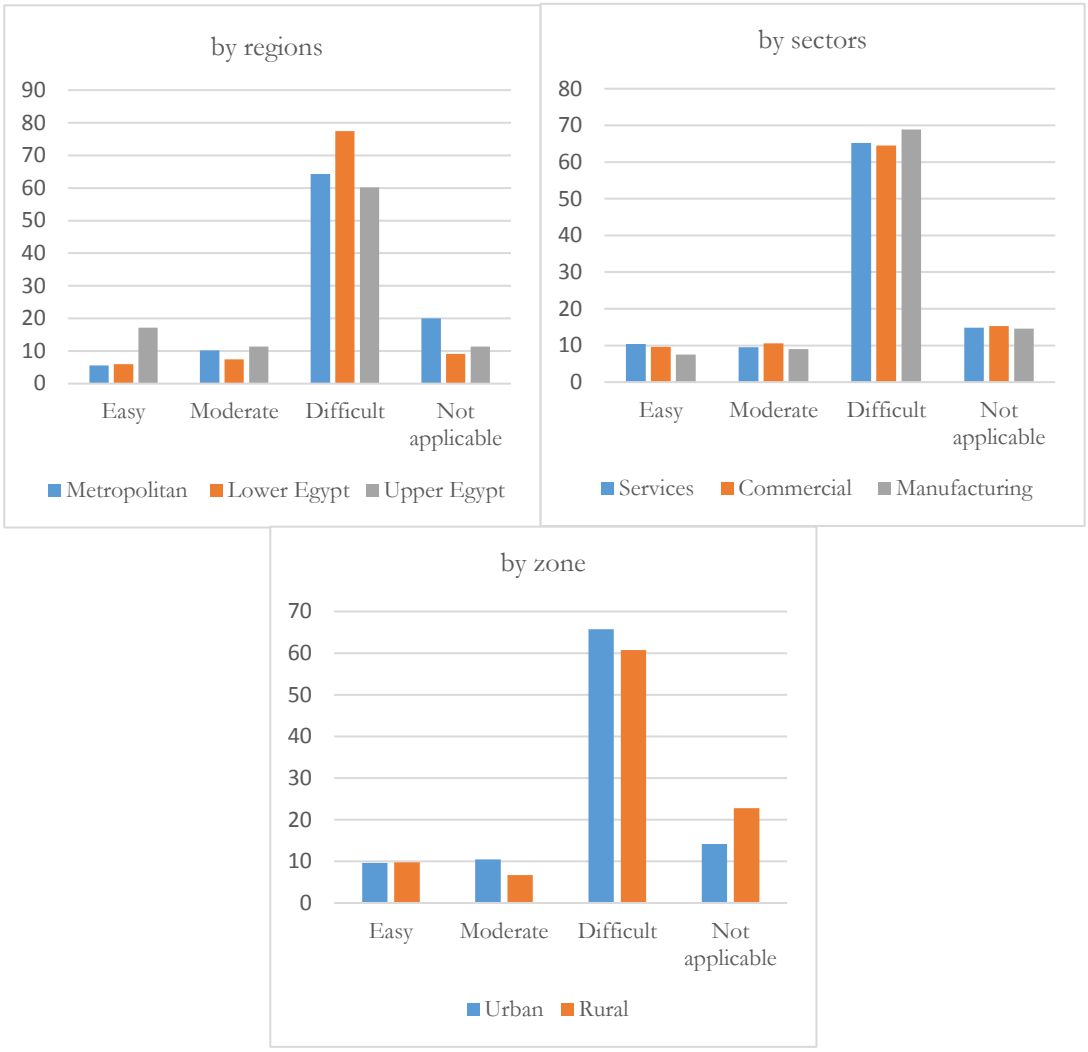
variable	Definition	Obs.	Mean	Std. Dev	Min	Max
$prod_i$	Monthly labour productivity calculated as the ratio between monthly total sales revenues in Egyptian pounds and total workers at the time of the interview	4953	952.67	6019.98	0	300000
$\widehat{regis}_i$	Dummy variable taking the value of one if the firm is registered at the tax department at start-up of the activity and zero otherwise	4956	.785	.41	0	1
$Gender_i$	Dummy variable taking the value of one if the M/SE's owner is male and 0 otherwise	4958	.895	.306	0	1

$Education_i$	Dummy variable taking the value of one if the M/SE's owner has a formal technical or vocational education level and zero otherwise	4956	.029	.169	0	1
$Training\ \&\ exp_i$	Dummy variable taking the value of one if the M/SE's owner has experience or training related to the present activity and zero otherwise	4958	.298	.457	0	1
Age_i	M/SE's owner's age at the time of the interview	4956	40.335	13.4	14	83
$Partners_i$	Dummy variable taking the value of one if the M/SE's owner has partners and zero otherwise	4904	.233	.42	0	1
$Urban_i$	Dummy variable taking the value of one if the M/SE is located in the urban area and zero otherwise	4958	.894	.307	0	1
$Infrastructure_i$	Dummy variable taking the value of one if the M/SE has access to water, electricity and roads, and zero otherwise	4952	.369	.482	0	1
$Technology_i$	Dummy variable taking the value of one if the M/SE use a modern or an up to date technology and zero if the firm uses a traditional technology	4936	.19	.392	0	1
$Competition_i$	Dummy variable showing the level of competition faced by M/SEs, taking the value of one if the M/SE has neighbouring enterprises engaged in related activities, and zero otherwise	4951	.272	.445	0	1
$Internal_i$	Dummy variable taking the value of one if the M/SE's initial source of capital is based on internal source of finance (inheritance or/& savings or/& own remittance or/& liquidation of assets) and zero otherwise	4953	.947	.223	0	1
$Credit_i$	Dummy variable taking the value of one if the M/SE got a line of credit during the last 12 months, and zero otherwise	4958	.0526	.223	0	1
Tax_adm_i	Discrete variable reflecting the severity of tax administration procedures =0 (easy)= 9.65% =1 (moderate)= 10.10% =2 (difficult)= 65.20% =3 (question is not applicable)= 15.05%					
$Region_i$	Regional location of the firm =0 (Metropolitan region)= 47.74% =1 (Upper Egypt region)= 34.43% =2 (Lower Egypt region)= 17.83%					
$Initial_i$	Source if firms' initial capital =0 (owner's savings)= 75.21% =1 (inheritance)= 19.52% =2 (credits)= 5.27%					

Source: author computation based on the 2003 M/SEs dataset collected by the Economic Research Forum (ERF)

Appendix 4

Figure 4.1. Severity of tax administration procedure by region, sector and zone



Source: author computation based on the 2003 M/SEs dataset collected by the Economic Research Forum (ERF)

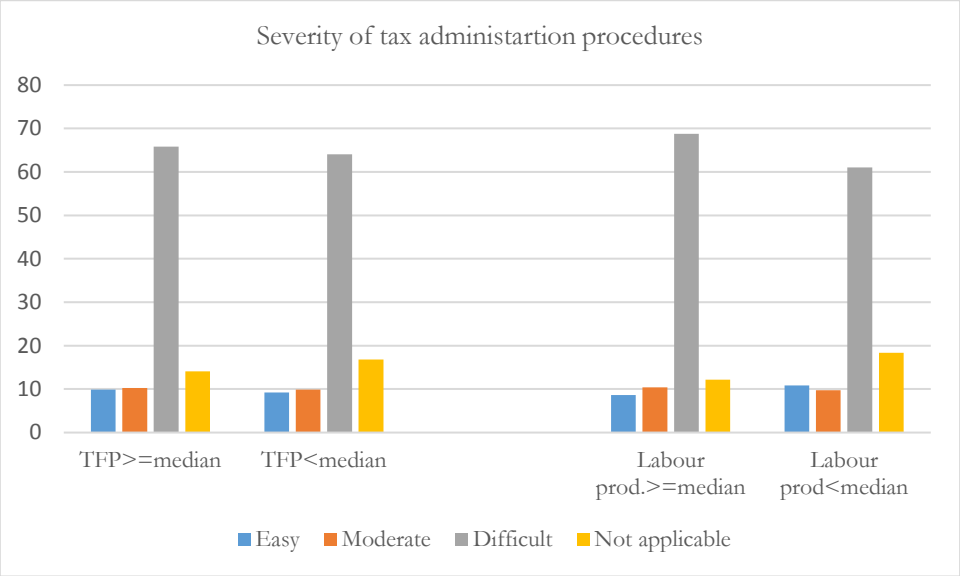
Appendix 5 Statistical characteristics of the instrumental variable (tax administration procedures)

Table 5.1. Correlation between M/SEs' labour productivity, registration and severity of tax administration procedures

Variables	$regis_i$	$lnprod_i$	Tax_adm_i
$regis_i$	1.0000		
$lnprod_i$	0.1030***	1.0000	
	(0.0000)		
Tax_adm_i	-0.2593***	-0.0287***	1.0000
	(0.0000)	(0.0072)	

Notes: Significance levels are between brackets. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

Figure 5.1. Severity of tax administration procedures and M/SEs' productivity



Source: author computation based on the 2003 M/SEs dataset collected by the Economic Research Forum (ERF)

Appendix 6

Table 6.1. Instrumental variable approach's first stage regression (other specifications)

	IV estimation- first stage		
Tax_adm_i	-0.137***	-0.128***	-0.115***
	(0.00724)	(0.00726)	(0.00730)
$Gender_i$		0.0724***	0.0681***
		(0.0185)	(0.0181)
$Education_i$		0.0596*	0.0457
		(0.0329)	(0.0321)
$Training\ \&\ exp_i$		0.0437***	0.0297**
		(0.0126)	(0.0124)
Age_i		0.000892**	0.000912**
		(0.000421)	(0.000411)
$Partners_i$		0.0880***	0.0593***
		(0.0135)	(0.0134)
$Urban_i$			0.197***
			(0.0192)
$Region_i$ *(ref. Metropolitan)*			
$Upper\ Egypt_i$			0.182***
			(0.0159)
$Lower\ Egypt_i$			0.0979***
			(0.0136)
$Infrastructure_i$		0.0886***	0.0967***
		(0.0119)	(0.0117)
$Technology_i$		0.0147	0.0392***
		(0.0147)	(0.0145)
$Competition_i$		-0.0611***	-0.0678***
		(0.0128)	(0.0127)
$Initial_i$ *(ref. savings)*			
$Inheritance_i$			0.0797***
			(0.0141)
$Credits_i$			0.0191
			(0.0249)
Constant	1.044***	0.871***	0.594***
	(0.0146)	(0.0294)	(0.0364)

Observations	4,810	4,721	4,716
R-squared	0.070	0.109	0.153
F-test of first stage	360.93	63.76	60.69

Notes: the dependent variable is a dummy variable taking the value of one if the M/SE acquired a tax card at start-up of the activity by registering at the tax department, and zero otherwise. The severity of tax administration procedures Tax_adm_i is the instrument used to predict our endogenous variable of interest (registration). List of variables is provided in table 3.1 (appendix 3). Robust standard errors are in parenthesis. *** Significant at 1 %. ** Significant at 5%. * Significant at 10%.

Appendix 7 Robustness check - Total factor productivity measure (TFP)

In order to verify the validity of our baseline results, we use a subset of firms, for which information on material costs is available, to compute the total factor productivity (TFP) measure. We consider the following Cobb Douglas firm-level production function:

$$y_i = b_0 + b_k k_i + b_l l_i + b_m m_i + \varepsilon_i \quad \textbf{(eq.9)}$$

$$TFP_i = \alpha_0 + \alpha_1 \widehat{regis}_i + \alpha_2 X_i + u_i \quad \textbf{(eq.10)}$$

Where, y_i is the monthly total sales revenues in EGP; k_i, l_i and m_i are the logarithm of the factors of productions (capital, labour and materials).

TFP_i is the value of TFP predicted from equation (9), $\widehat{regis}_i$ is the predicted probability of M/SEs' registration at the tax department instrumented using the severity of tax administration procedures Tax_adm_i, X_i includes a number of control variables that account for the characteristics of the M/SE and its entrepreneur.

Table 7.1. Informality and M/SEs' productivity using TFP

	TFP estimation (equation 9)	IV estimation - Second stage	
		Baseline regression (equation 3)	TFP regression (equation 10)
	(1)	(2)	(3)
k_i	0.174***		
	(0.0239)		
l_i	0.421***		
	(0.0671)		
m_i	0.210***		
	(0.0222)		
$\widehat{regis}_i\_IV$		0.712***	0.806**
		(0.186)	(0.340)
$Gender_i$		0.242***	-0.00767
		(0.0499)	(0.172)
$Education_i$		0.0913	0.291**
		(0.0977)	(0.109)
$Training\ \&\ exp_i$		0.0441	0.453***
		(0.0352)	(0.106)
Age_i		-0.00326***	-0.00466
		(0.00116)	(0.00311)
$Partners_i$		-0.173***	-0.131
		(0.0410)	(0.0727)
$Urban_i$		-0.0722	0.00882
		(0.0645)	(0.166)
$Region_i$ *(ref. Metropolitan)*			
$Upper\ Egypt_i$		-0.0775	0.0305
		(0.0585)	(0.213)
$Lower\ Egypt_i$		-0.461***	0.0142
		(0.0448)	(0.217)
$Infrastructure_i$		0.00656	0.00745

		(0.0364)	(0.119)
$Technology_i$		0.308***	0.410*
		(0.0427)	(0.175)
$Competition_i$		0.279***	0.148
		(0.0393)	(0.334)
$Initial_i$ *(ref. savings)*			
$Inheritance_i$		0.00322	-0.0933
		(0.0406)	(0.0545)
$Credits_i$		0.228***	0.333**
		(0.0724)	(0.122)
Constant	3.475***	5.484***	-0.732
	(0.178)	(0.101)	(0.438)
Observations	3,533	4,716	3,453
R-squared	0.111	0.065	0.019
F-test of first stage		60.69	44.14
		{0.0000}	{0.0000}
level of se cluster	-	-	Governorates

Notes: in column (1), the dependent variable is logarithm of M/SEs' monthly sales revenues in EGP in. column (2), the dependent variable is a dummy variable taking 1 if the M/SE acquired a tax card at start-up of the activity by registering at the tax department, and zero otherwise. In Columns (3), the dependent variable is M/SEs predicted TFP. $\widehat{regis_i}$ is the predicted variable of registration instrumented using the severity of tax administration procedures as an instrument Tax_adm_i. List of variables is provided in table 3.1 (appendix 3). F-test of first stage is the test statistic of the significance of the instrument in the first-stage regressions, with p-values in braces. Robust standard errors are in parenthesis. *** Significant at 1 %. ** Significant at 5%. * Significant at 10%.

Appendix 8

Table 8.1. Instrumental variable estimation vs. 2SLS estimation

	Productivity equation (equation 3)		Access to credits equation (equation 8)	
	IV	2SLS	IV	2SLS
	(1)	(2)	(3)	(4)
$\widehat{regis}_{i\_IV}$	0.712***		0.0910**	
	(0.186)		(0.0356)	
$\widehat{regis}_{i\_2SLS}$		1.008***		0.128***
		(0.173)		(0.0275)
$Internal_i$			-0.478***	-0.477***
			(0.0220)	(0.0220)
$Gender_i$	0.242***	0.225***	0.00447	0.00210
	(0.0499)	(0.0487)	(0.00951)	(0.00929)
$Education_i$	0.0913	0.0774	0.00341	0.00178
	(0.0977)	(0.0968)	(0.0181)	(0.0178)
$Training\ \&\ exp_i$	0.0441	0.0313	-0.00347	-0.00497
	(0.0352)	(0.0349)	(0.00569)	(0.00555)
Age_i	-0.00326***	-0.00371***	6.31e-05	1.38e-05
	(0.00116)	(0.00117)	(0.000173)	(0.000165)
$Partners_i$	-0.173***	-0.194***	0.00269	-0.000347
	(0.0410)	(0.0404)	(0.00730)	(0.00693)
$Urban_i$	-0.0722	-0.137**	-0.0150	-0.0232**
	(0.0645)	(0.0612)	(0.0126)	(0.0115)
$Region_i$ *(ref. Metropolitan)*				
$Upper\ Egypt_i$	-0.0775	-0.142**	-0.0208**	-0.0284***
	(0.0585)	(0.0571)	(0.00989)	(0.00865)
$Lower\ Egypt_i$	-0.461***	-0.504***	-0.00776	-0.0127*
	(0.0448)	(0.0441)	(0.00831)	(0.00754)
$Infrastructure_i$	0.00656	-0.0267	-0.00552	-0.00941
	(0.0364)	(0.0360)	(0.00652)	(0.00604)
$Technology_i$	0.308***	0.291***	-0.00432	-0.00613
	(0.0427)	(0.0419)	(0.00687)	(0.00665)
$Competition_i$	0.279***	0.304***	0.0166***	0.0192***
	(0.0393)	(0.0390)	(0.00637)	(0.00599)

$Initial_i$ *(ref. savings)*				
$Inheritance_i$	0.00322	-0.0213		
	(0.0406)	(0.0409)		
$Credits_i$	0.228***	0.214***		
	(0.0724)	(0.0706)		
Constant	5.484***	5.395***	0.420***	0.407***
	(0.101)	(0.0963)	(0.0281)	(0.0271)
Observations	4,716	4,717	4,845	4,846
R-squared	0.065	0.088	0.420	0.441
F-test of first stage	60.69 {0.0000}		64.21 {0.0000}	

Notes: in columns (1 & 2), the dependent variable is the logarithm of M/SEs' monthly labour productivity. In columns (3 & 4), the dependent variable is a dummy variable taking the value of one if M/SE's initial capital is based on formal credits, and zero otherwise. In column (1 & 3) we are implementing an instrumental variable estimation that instruments the endogenous variable $regis_i$ by its instrument Tax_adm_i. In column (2 & 4) we are implementing a 2SLS estimation in which the first regression consists of a probit equation that estimates the endogenous variables $regis_i$ using its instrument Tax_adm_i. The second stage consists of an OLS estimation that estimates the effects of the predicted $\widehat{regis}_i$ (from the first stage) on M/SEs' productivity in column (2), and on M/SEs access to formal credits in column (4). All monetary variables are in Egyptian pounds. List of variables is provided in table 3.1 (appendix 3). F-test of first stage is the test statistic of the significance of the instrument in the first-stage regressions, with p-values in braces. Robust standard errors are reported between brackets. *** Significant at 1 %. ** Significant at 5%. * Significant at 10%.

Chapter (2)

Informal competition, firms' productivity and policy reforms in Egypt[16]

(With Boris NAJMAN[*])

Abstract

This chapter investigates the effect of the competition stemmed from informal firms on formal firms' productivity in Egypt. Using the World Bank's Enterprise Surveys, we update the two-step methodology of Guiso et *al.* (2004) to build a new regional-level indicator of informal competition intensity. Our estimation reports a positive and significant effect of this indicator on formal firms' productivity that remains valid to multiple robustness check. Using a difference-in-difference approach, we provide evidence that informal firms' cost advantage is the main driver of the reported positive effect. Our results call on the importance of tax reforms and effective regulation to be implemented in Egypt.

Keywords. Informal competition, Firms' productivity, Taxation, Firms' constraints, Egypt.
JEL. O17, D22, L25.

[16] A preliminary version of this chapter was presented and accepted for publication (Working paper) at the Economic Research Forum (ERF, Cairo, Egypt): Ali, N., & Najman, B. (2016). Informal competition, firms' productivity and policy reforms in Egypt. (ERF Working Paper No. 1025). Cairo, Egypt: Economic Research Forum
A more recent version is accepted for publication in the book: "*The informal economy: exploring drivers and practices",* Eds.: Ioana A. Horodnic, Peter Rodgers, Colin C. Williams and Legha Momtazian

[*] B. NAJMAN, Université Paris-Est, ERUDITE (EA 437), F-94010, Créteil, France, CASE. Email: najman@u-pec.fr

1. Introduction

Decades of researches widespread the harmful impacts of the informal sector.[17] This sector has always been considered as a temporary shelter for poor that comprises small, unproductive and labour intensive activities, which do not comply with any regulation and are the major cause of unfair competition (OECD, 2009). That's why they should disappear with economic development. However, this sector is becoming very persistent today and is incredibly growing around the world. According to Schneider et *al.* (2010)'s figures, informal activities account for 17% of gross domestic product (GDP) in developed countries and 34% of GDP in developing countries. This ironic picture encouraged researchers - starting by De Soto (1990) - to look at the entrepreneurial capacity of the informal sector that might generate positive outcomes. This chapter advances this question by testing the effect of competition stemmed from informal firms (hereafter informal competition) on formal firms' productivity in Egypt.

Egypt is an interesting example showing the controversy of the informal sector. While most of existing studies emphasized the negative impacts of this sector on the overall Egyptian economy (see for instance Galal, 2004; El-Hamidi, 2011), its size continues to grow very fast and attained 49.6% of total non-agricultural activities in 2012 (Charmes, 2012). Comparing to other MENA (Middle East and North Africa) countries (table 1.1, appendix 1), Egypt is ranked among the highest in the contribution of the informal economy in official GDP and the share of informal employment in total non-agricultural activities. Also, the shares of total unemployment, especially youth unemployment, are very large (13.2% of total labour force and 34.3 % of total labour force aged 15-24 in 2013 respectively), and poverty rates remain very challenging (25.2% of total population in 2010). That's why the informal sector became the norm in Egypt and is considered, today, as the first revenue for poor, unemployed and underemployed.

Up till 2007, the Egyptian economy was performing well in terms of GDP trends and the adoption of useful reforms to reinforce the private sector (figure 1.1, appendix 1). However, the persistence of institutional imperfections caused the failure of formal sector's benefits and made the existence of the informal sector legitimate. For example, corruption practices are severely affecting the economy and are associated with a very weak regulatory environment (World Bank, 2014). That's why doing business in Egypt remains very challenging and almost 50% of formal firms report competing against informal firms. Hence, the deteriorated quality of the local business environment

[17] See for instance Harris & Todaro, 1970; Hart, 1973; Rauch, 1991; Djankov et *al.*, 2004; La Porta & Shleifer, 2008 & 2014

caused informal competition to be considered as one of the major obstacles faced by formal firms (World Bank, 2014).

Following the hypothesis of Maloney (2004) and Williams at *al.* (2016), we claim that informal firms might be inherently entrepreneurial in Egypt via the competition pressure that they are exerting in the market. As these firms evade taxes and do not comply with regulation and its related costs, they have an advantage in cost over formal firms that allows them to take away market shares from formal firms. Hence, under certain conditions, informal competition pushes formal firms to boost their productivity, in order to overcome informal firms' advantage in cost by better allocating unused resources. These conditions account for the degree of institutional imperfection that determines the differential in cost between formal and informal firms.

Yet, informal competition is also considered as a threat to the economy. Existing empirical studies tackling informal competition assumed by default its harmfulness and tried to identify the main characteristics of formal firms that make them more or less vulnerable to informal competition (see Gonzalez & Lamanna, 2007, Friesen & Wacker, 2013). This chapter tries to test the validity of this default hypothesis by empirically showing how informal competition would affect the productivity of formal firms, as well as the channel through which this effect might occur. We assume that the entrepreneurial capacity of the informal sector will be more felt locally because informal competition has a local effect rather than a national or international effect. Hence, we contribute to the literature by implementing a regional analysis within a single country that scores the highest percentages of informality among North African countries; Egypt.

Our estimation is based on the Egyptian panel manufacturing World Bank Enterprise Surveys (WBES), an unbalanced panel dataset of 3020 manufacturing private formal firms interviewed in 2004, 2007 and 2008, covering eight manufacturing industries over 23 Egyptian governorates. This is the only dataset that gives information about the intensity of informal competition from the perception of formal firms. Using the two-step methodology of Guiso et *al.* (2004), our empirical analysis starts by constructing a new indicator that measures the intensity of informal competition in each governorate included in the sample. Reported scores of this indicator confirm the strong persistence of informal competition across Egyptian governorates.

Our baseline results of the effect of regional informal competition on formal firms' productivity, highlight the entrepreneurial capacity of informal firms. Our regression reports a positive and significant effect that remains valid when using different measures of productivity and different specifications. However, these baseline results reveal two econometric biases. The first is the

reverse causality bias since informal competition and formal firms' productivity are jointly determined. The second is the omitted variable bias due to unobservable regional and time factors. In order to solve these econometric issues, we present two different robustness tests. From one hand, we instrument our endogenous indicator of informal competition intensity by the voter turnout of the 2012 presidential elections in Egypt measured at the governorate level. From the other hand, we construct another indicator of informal competition that accounts for the regional dimension as well as the panel dimension of our dataset (a regional-yearly informal competition indicator). We then introduce regional dummies in our productivity regression to remove all potential unobservable effects. The results of these attempts remain robust to our baseline results and propositions.

Furthermore, using a difference-in-difference model, we evaluate the effectiveness of the "2005 new tax law" which is considered as the first substantial reform of the Egyptian's fiscal system that succeeded in reducing the size of the informal sector and the differential in cost between formal and informal firms. The result of this model identifies informal firms' cost advantage as the main channel through which informal firms are able to exert an efficient competitive pressure on formal firms. It also provides evidence on the importance of tax reduction and alleviation of burdensome procedures in creating a more friendly business environment.

This chapter is laid out as follows. Section (2) starts by exploring a brief review of the economic situation and the informal sector in Egypt. Section (3) presents the review of the literature and defines the hypotheses of our model. Section (4) presents the dataset and our econometric model. Section (5) presents and discusses the main econometric results. We finally conclude in section (6).

2. Stylized facts on the Egyptian economy and its informal sector

The increasing informality trend in Egypt goes hand in hand with the adoption of adjustment programs and new reforms (figure 1.1, appendix 1). It all started in the 70's when the government decided to downsize the public sector by privatizing public enterprises, and to adopt an open trade policy after decencies of state control. The emergence of a large informal sector was the first result of these reforms as the private formal sector was unable to absorb the excess of labour force (El-Mahdi, 2000). Afterward, several shocks helped in nourishing the development of this sector; the increase in oil prices followed by the Arab-Israel war in 1973, the "Dutch disease" associated with foreign aid inflows and real exchange rates' appreciation, to end up with the collapse of the Egyptian economy due to budget and trade deficits. In addition to the existing burdensome registration, licensing and tax administrative procedures, other internal factors played an important role in expanding the size of the informal sector. For example, the rigidity of the 1981 labour law -

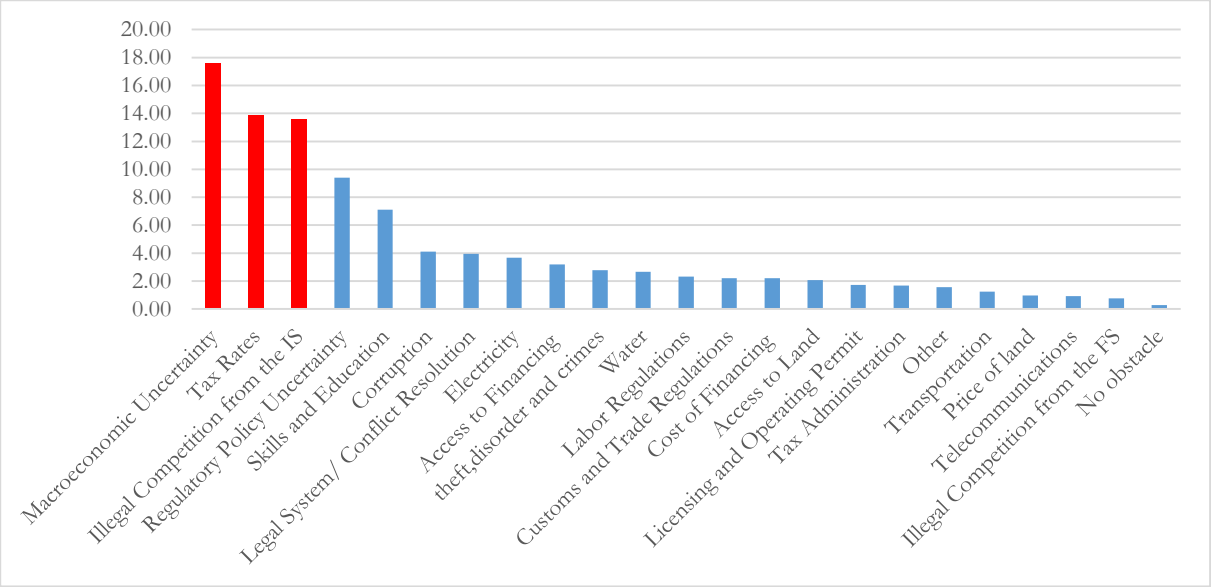
adopted up till 2003 - pushed many private employers to favour informal employment. Also, trade reforms in 1991 and 2004 caused a severe foreign competition that forced employers to favour part-time employment and informal employment in order to reduce costs (Selwaness and Zaki, 2013).

Therefore, with low labour participation rate (around 50%), underemployment and decreasing public jobs, the share of informal employment in total non-agricultural economy increased from 38.8% in 1980 to 65.3% in 1990. As a result of the 2003 new labour law (no.12/2003) and the 2005 new tax law (no.91/2005) - that introduced more flexibility in the Egyptian private labour market in terms of legal contract, tax alleviation and effective tax collection techniques - the percentage of informal employment dropped to 36.2% in 2006. However, in 2009, its rate regained strength and reached 51.2% (Charmes, 2000, Assaad, 2009, ILO, 2012). In addition, barriers to formal jobs encouraged many Egyptians to start small activities. In 2010, micro, small and medium-sized enterprises accounted for 90% of active enterprises in Egypt and contributed with over 80% of the GDP and to 75% of total employment (OECD, 2011). Yet, the majority of these firms are informal and rather die than register due to government's incapacity to provide basic services – in terms of infrastructure, training, technology and access to finance - which reduces dramatically their productivity (Ali, 2014.).

The incidence of unfair competition is largely pronounced in the Egyptian manufacturing sector, one of the most contributing sector in GDP growth. As shown by El-Fattah (2012) employers in this sector have a higher probability of remaining informal. According to the 1998 Egyptian Labour Market Survey and the 2006 Egyptian Labour Market Panel Survey, this sector is characterized by a relatively higher share of female workers, young and less educated workforce and small enterprises. Between 1998 and 2006, 18.8% of workers in the manufacturing sector shifted from informal to formal jobs, while 24% of workers shifted from formal to informal sector activities. In addition, the share of informal activities in this sector increased from 44.24% to 54.86% during the same period.

Figure (1) shows the most important obstacle faced by manufacturing formal firms in Egypt according to the WBES. These firms consider competitors' practices in the informal sector as the third most important obstacle after macroeconomic uncertainty and tax rates. That's why these firms claim the importance of alleviating burdensome laws, red tape and high costs of licensing and registration. They also request easier access to finance and call for more transparency as more connected and well established firms gain unexplained privileges.

Figure 1. Formal firms' most important business' obstacles in Egypt



Source: author calculation based on the Egyptian manufacturing World Bank Enterprise Survey (2004-2007-2008).

Egypt suffers from deep governance weaknesses and institutional imperfection. According to the World Bank Doing Business Report (World Bank, 2014), the country is ranked 105 over 128 in ease of Doing Business. The size of the informal sector is equally important across rural and urban areas and is very persistent in all Egyptian governorates. For example, Alexandria is ranked first in ease of starting a business but is listed among the governorates with the highest intensity of informal competition. The perception of formal firms toward informal competition obstacle is at its highest level in Damietta and Qalyubia governorates, comparing to Sharkiya, Gharbiya and Upper Egypt governorates. Also, starting and registering a business is easier in Cairo and Giza comparing to Aswan, Port Said and Souhag.

Although Egypt was considered as a fast growing economy since 2000 (over 5% of GDP growth between 2000 and 2011) and the largest economy within the MENA region, the post-revolution economic growth reported a dramatic decrease in GDP growth to 2% in 2013. In addition, unemployment rates increased from 9% to 13% between 2010 and 2013 and fiscal deficit reached 100% of GDP during mid-2013 (Central bank of Egypt, 2014). The economic crisis contributed to the raise of social frustration. Today, participants in the informal sector in Egypt choose voluntary to remain informal and the sector becomes a permanent state of employment instead of a temporary shelter for poor (Wahba, 2009). That's why, the informal sector is growing at a more rapid rate than the formal sector and is becoming visible in all sectors (Avirgan et *al.*, 2005; African Development Bank, 2009).

3. Literature review and hypotheses

Few papers in the literature tackled informal competition. Although these papers put forward its negative impacts, they present evidence on its widespread prevalence and effects. The paper of González and Lamanna (2007) proves that formal and informal firms in Latin America compete with each other and are not in segmented or separated markets as suggested by the dual economic theory. Their probit regression shows that formal firms most resembling informal ones are the most adversely affected by informal competition. They are usually small, credit constrained, operating in industries with low entry costs and serving the same kind of consumers as informal firms do. The nonlinear ordered response model of Friesen and Wacker (2013)'s paper adds that more financially constrained formal firms are more subject to informal competition in developing and transition countries.

The prevalence of informal competition in Egypt is very important and is considered one of the top obstacles for formal firms. This is due to the fact that the informal sector in Egypt creates a multiplier effect; once a firm or a person joins the informal sector, the social stigma associated to operate informally decreases and operating informally becomes legitimate (Ali, 2014). As informal competition is a local phenomenon, we notice that its incidence in Egypt is very heterogeneous across governorates and sectors depending on the level of ease of doing business and entry costs. Therefore, we assume that informal competition must be analysed on a local level because informal firms are less susceptible to operate, compete and to supply the market nationally, and much less so internationally.

Hypothesis 1 *Informal competition is very persistent - especially on the local level - because informal firms are able to exert a strong competitive pressure on formal firms.*

Historically, the relationship between formal and informal firms has been analysed from the perspectives of different schools of thought that underline the controversy raised by the informal sector. According to the Dualist School, the informal and formal sectors coexist but are very different by nature. While Formal firms contribute to economic growth, informal firms act as a shelter for poor (Lewis, 1954; Harris and Todaro, 1970; Hart, 1973; ILO, 1972; Rauch, 1991). According to the Structuralist School, the informal sector is linked by nature to the formal sector because informal firms are subordinated to formal and larger firms and allow them to reduce costs and increase competitiveness. However, the Voluntarist School considers informal firms as a threat because these firms intentionally choose to be informal and are not willing to formalize. These firms cause unfair competition and are able to inefficiently take market shares from more

productive formal firms. The thoughts of the Legalist School, supported by De Soto (1990 & 2000), show the important role played by the informal sector and argue in its favour. They explain that informal firms choose to be informal to avoid the burden of taxes and regulations. They are not considered as a threat for formal firms since they are willing to formalize if the government provides them property rights and alleviates registration procedures. This idea has been adopted by more recent papers highlighting the entrepreneurial capacity of the informal sector.

Advancing the importance of revisiting the question of informality, Maloney (2004, p.1) considers informal activities in developing countries as "*an unregulated micro-entrepreneurial sector and not as a disadvantaged residual of segmented labour markets*". Similarly, Webb et *al.* (2009 & 2013) propose an extensive list of factors that recognize informal sector's opportunities, among which are institutional distrust and imperfection, burdensome cost and procedures, and resource-constrained business environment. In addition, using a Heckman 2-step model with firm-level WBES dataset on 127 developing countries, Williams et *al.* (2016) find that the performance of formal firms that start-up unregistered and spend more years operating informally is stronger than the performance of firms allocating all their resources to register from the outset. Amor-s et *al.* (2016) prove empirically that the informal sector has a positive effect on economic development measured by country-level income & non-income Human Development Index. They argue that in countries with weak institutions, a certain amount of the informal sector is necessary as a practical substitute for the formal sector.

As already mentioned, the incredible growing number of informal firms is mainly due to strong institutional imperfection in terms of tax provision and government capacity to enforce law and regulation. As a result, the larger is the number of informal firms, the lower are the national tax revenues; which in turn causes the reduction of public service provision and/or the increase of tax rates that strengthen the incentives to join the informal sector. Therefore, this vicious cycle creates a reallocation of labour resources in the direction of the informal sector, allowing informal enterprises to exert a strong competitive pressure on formal firms. That's why we assume that in societies with strong institutional imperfection like Egypt, the informal sector plays an important role in exploiting idled resources.

Hypothesis 2 *Informal firms have an entrepreneurial capacity and are considered as an economic resource rather than a threat.*

We advance the idea that the competition process between formal and informal firms could be considered as an effective tool to exploit underlined idled resources for two reasons. First,

competition from informal firms is mainly based on creativity, since efficiency is very challenging for them because of the absence of economies of scales. In their case, creativity typically does not relate to the development of new technologies, but is rather in terms of adopting new managerial practices. As informal firms are usually small and managed by a single person, they have more simple communication strategies and more flexible production processes. They are able to quickly move where there is a demand and to serve the market with new and less expensive products and services. They are also able to adapt more easily their labour organisation and internal management to handle different market shocks (Saviotti and Pyka, 2008; Gülbiten and Taymaz, 2000; Duchêne and Rusin, 2002). These facts also give evidence on the entrepreneurship capacity of informal firms.

Second, informal competition is also driven by the advantage in cost that informal firms have over formal ones, since they are avoiding taxes and regulation. This cost advantage is considered as a positive force, allowing informal firms to operate more efficiently (Schneider and Enste, 2000). Even though informal firms might be less productive than formal ones, the higher will be the cost differential between formal and informal firms, the greater will be the ability of informal firms to take market share from bigger and more productive firms (La Porta and Shleifer, 2008). According to that, we claim that informal competition might push formal firms to boost their productivity to overcome the differential in cost and regain their market shares. Informal competition may also push formal firms to adopt better and more efficient internal organisation techniques to be as flexible and dynamic as informal firms. Hence, informal firms could be entrepreneurial via their competition pressure.

Hypothesis 3

a) Informal competition might have a positive effect on formal firms' performance.

b) This positive effect is mainly driven by informal firms' cost advantage.

4. Model and data

We use the Egyptian panel manufacturing WBES data on formal firms' performance over the period 2004, 2007 and 2008 to examine the impact of regional informal competition on formal firms' productivity.[18] The sample design of the WBES presents a representative sample of 3020 manufacturing (non-agricultural) private formal firms using three levels of stratification; sector of activity, size and location. Fully government-owned enterprises were excluded from the survey. The sample includes small (37%), medium (30%) and large-sized (33%) firms operating in eight

[18] The data are available and downloadable through the World Bank portal - http://www.enterprisesurveys.org

different manufacturing industries and located across 23 governorates. This sample allows us to benchmark the Egyptian business environment from a micro-perspective, the firm-level's perspective.[19]

According to appendix (2), most of surveyed firms are located in Greater Cairo close to the capital city where the highest population density and consumption exist. And according to appendix (3), the majority tend to operate out of industrial zones in manufactures like textile (16%), metal (15.8%), chemicals (12%) and garments (11%). Firms have an average of 23 years old and are mostly operated by educated managers with some university degrees. However, they do not have access to neither technology nor source of funding. And, their working capital is mainly based on internal earnings (*i.e.* only 12% of firms in the sample have a line of credit and 22% have a saving account). Most importantly, competition from the informal sector is perceived by formal firms as the third most important obstacle after tax rates and macroeconomic uncertainty, *i.e.* 46% of formal firms perceive illegal competition from the informal sector as a very severe obstacle.

As the number of followed up firms across the years is very limited (as shown in table 4.1, appendix 4), we use this dataset as a pooled sample to estimate the following benchmark regression using Ordinary Least Square estimation (OLS);

$$lnProd_i = \beta_0 + \beta_1 IRIC_k + \beta_2 Z_i + \alpha_r + \alpha_s + \alpha_p + \alpha_t + \varepsilon_i \qquad \textbf{(eq.1)}$$

Where $lnprod_i$ is the dependent variable that measures the logarithm of productivity of formal firm (i). $IRIC_k$ is our independent variable of interest, constructed using the two-step methodology of Guiso et *al.* (2004) and measuring the intensity of informal competition across governorates (k). We include fixed effects to control for unobserved factors related to the firm's regional location (α_r), firm's industry (α_s), the interview year (α_t) and the number of times each firm is interviewed (α_p). As $IRIC_k$ is constructed from a preliminary estimation, we implement a bootstrap resampling methodology to ensure the compliance of this variable with standard statistical properties.

The vector Z_i controls for a set of firm-level characteristics.[20] We account for firm's size ($SIZE_i$), age (AGE_i) and ownership type ($SHARE_i$). The level of human capital is measured via the variable (EDU_i) that scores the level of education of the firm's top manager and the variable ($TRAIN_i$) that takes the value of one if the workers of the firm received internal or external trainings. We also

[19] Surveys were administrated using face-to-face interviews with the owner or the manager of the firm.

[20] Table 3.1 (appendix 3) provides a detailed list of the variables included in the regression.

include other important variables clarifying the situation of the firm on the market such as the variable (EXP_i) that measures the percentage of direct and indirect exports in firms' total annual sales and the variable (IND_i) that takes the value of one if the firm is located in an industrial zone. Lastly, we control for the firm's acquisition of property and casualty insurance on its assets (INS_i), as well as its acquisition of other factories and branches ($FACT_i$) and of certified financial statements (FI_CERT_i).

4.1 Measuring formal firms' productivity

Based on firm's value added, our dataset allows us to compute firms' single factor productivity (labour productivity) as well as firms' total factor productivity (TFP).

According to equation (2), value added is the difference between total annual sales revenues and intermediate goods (including costs of materials, energy & fuel, transports, water, telephone, communication and electricity and excluding taxes).[21] In order to ensure that we keep the most credible monetary data, we exclude firms with very large sales (firms with labour productivity in Egyptian pounds three standard deviations away from the mean value).[22] The remaining data can be trusted, given that the enumerators of the WBES were asked to confirm the accuracy of monetary information.

$$VA_i = total \text{ annual } sales\ revenues_i - intermediate\ goods_i \quad \textbf{(eq.2)}$$

From one hand, we compute the logarithm of formal firms' labour productivity as the ratio of the firm's annual value added to the firm's total annual full-time permanent workers

$$\ln(PROD1_i) = \ln \frac{VA_i}{Total \text{ annual } fulltime\ permanent\ workers_i} \qquad \textbf{(eq.3)}$$

In order to control properly for the size effect, we extend this measure by accounting not only for full-time permanent workers but also for a weighted measure of part-time permanent workers and temporary workers.[23] As shown in equation (4 & 5) below, this measure accounts for enterprises

[21] All monetary values are in Egyptian pound.

[22] In total, about 264 firms were identified as outliers.

[23] The total number of part-time permanent workers is weighted by 0.625 according to a computation made by the authors using the ILO part-time convention of 1994 (no. 175) and the Egypt Labor Market Panel Survey 2012 dataset (OAMDI, 2013). According to our computation, the average hours worked per day for a part-time worker in Egypt is 5 hours, comparing to 8 hours a day for a full-time worker.

that rely more extensively on short-term and part-time employment and that might be subject to more intense informal competition.

$$\ln(PROD2_i) = \ln \frac{VA_i}{Total \text{ annual } workers_i} \quad \textbf{(eq.4)}$$

Where,

$$Total \text{ annual } workers_i = total \text{ annual } fulltime\ permanent\ worker_i + total \text{ annual } parttime\ permanent\ workers_i * 0.625 + total \text{ annual } temporary\ workers_i \quad \textbf{(eq.5)}$$

From the other hand, we use Levinsohn & Petrin (2003)'s production function to compute formal firms' TFP. This methodology is an extension of Olley and Pakes (1996)'s methodology that uses intermediate inputs as a proxy rather than investment to control for unobservable productivity shocks and obtain a consistent estimator of TFP. Intermediate inputs could be electricity, fuel or materials. The choice between these proxies depends on the number of non-zero observations that ensures the monotonicity assumption between the proxy and the output.[24]

According to table (1) below, we choose formal firm's total costs of energy and fuel as proxy (non-zero observations=98%). We account for formal firm's labour inputs by the total number of workers as computed in equation (5) and for formal firm's capital value by the total value of machinery and equipment (incl. transports).

Table 1. Levinsohn & Petrin (2003)'s total factor productivity measure

	$\ln(VA_i)$
$\ln(Total\ annual\ workers_i)$	0.580***
	(0.0398)
$\ln(Capital_i)$	0.286***
	(0.0323)
return to scale	15.65***
Observations	2,778

Notes: robust standard errors are reported in brackets. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

As highlighted in table 5.1 (appendix 5), average formal firms' labour productivity and TFP are respectively 75303 EGP (about 13085$) and 68066 EGP (about 11837$) corresponding to an average total annual workforce of 515.[25] Figures 5.1 and 5.2 (appendix 5) show that the highest

[24] This assumption is hard to be satisfied using investment especially that our dataset presents little information about firm level investment, but presents significantly less zero-observations in materials.

[25] Average period exchange rate (2004, 2007, 2008) equals 1 US$= 5.75EGP

productivity values are reported for larger firms concentrated in Souhag & Luxor (Northern & South Upper Egypt), Giza & Qalyubia (greater Cairo) and Sharkiya (Suez Canal) governorates. Those firms mainly operate in metal industries, agro-industries and chemicals industries.

4.2 Measuring informal competition

The WBES lack information about the number of competitors in the market, and more particularly about the number of informal competitors or loses due to informal competition. The only variable that gives information about the intensity of informal competition is a subjective variable ($Perceive_i$) that rates the perception of formal firms towards informal competition as stated below; [26]

Do you think that the practices of competitors in the informal sector are no obstacle, a minor obstacle, a moderate obstacle, a major obstacle, or a very severe obstacle to the current operations of this establishment?

As ($Perceive_i$) is comparable across the 23 governorates included in our sample, we choose to construct a regional indicator of informal competition intensity (hereafter IRIC) using the two-step method developed by Guiso et *al.* (2004) who have constructed a regional indicator of financial development in 20 Italian regions.[27] First, this methodology removes any potential bias linked to the direct inclusion of the perception variable in our benchmark regression.[28] Second, the generated regional indicator allows us to test our baseline hypothesis assuming that competition stemming from informal firms has a local effect rather than a national or international effect.

According to this methodology, the dependent variable is the perception variable ($Perceive_i$) that we transform into a dummy variable ($PERCEIVE_i$) that equals one if the firm perceives informal competition as a moderate, major or very severe obstacle, and zero otherwise (if the firm perceives

[26] 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.

[27] Guiso et *al.* (2004)'s paper studied the effects of local financial development by estimating a regional effect of financial development on the probability that a household is excluded from the credit market. This methodology was also used in Bagayev and Najman (2014) and Villegas-Sanchez (2009).

[28] The perception variable ($Perceive_i$) might be directly included in our baseline regression as the independent variable of interest. This may cause misleading results because of over-reporting or under-reporting behaviors. Formal firms will be more motivated to over-report their answers in order to blame the authorities for the existence of informal firms.

it as no obstacle or minor obstacle).[29] As our dependent variable is binary, we estimate the first-step equation of Guiso et *al.* (2004)'s methodology using a probit regression. This regression accounts for other firm-level variables that assess the factors affecting the intensity of informal competition as perceived by formal firms in each governorate and over the periods 2004, 2007 and 2008, as follows;

$$PERCEIVE_i = \alpha_0 + \alpha_1 X_i + \delta\, GOV_k + D_p + D_t + \epsilon_i \qquad \textbf{(eq.6)}$$

Where X_i is the vector of firm-specific attributes that might explain firms' responses towards their perception of informal competition. It includes variables measuring the size of the firm ($Total\ annual\ fulltime\ permanent\ workers_i$), its age ($AGE_i$), its capacity utilization (CAP_i), its ability to offer trainings to workers ($TRAIN_i$), the highest level of education of the top manager (EDU_i), the percentage of unionized workers ($UNION_i$) and the different constraints faced by the firm in terms of tax rates (TAX_i), corruption (COR_i) and finding adequate skilled and educated workers ($SKILLS_i$). We also cluster our regression by region-industry and we introduce controls for the number of times the firm is interviewed (D_p) and for the unobserved year-specific factors (D_t).

Our variable of interest is GOV_k, a set of governorate dummies. In order to ensure the statistical reliability of $IRIC_k$, we should have a minimum of 20 firms per governorate. We have an average of 131 firms per governorate, but some governorates include less than 25 firms. That's why estimating $IRIC_k$ over the 23 governorates included in the sample yields to the insignificance or the drop of 26% of governorates. Therefore, we group some similar governorates (in terms of geographical proximity) to end up with 16 groups (4 groups of aggregated governorates and 12 single governorates - see table 2.1, appendix 2).

Our reference governorate is Port-Said, in which there is the smallest number of formal enterprises perceiving informal competition as a binding constraint. There is an average of 87 formal firms perceiving informal competition as a binding constraint in each governorate. According to our sample, 68% of formal firms perceive it as a binding constraint. The most competing firms are

[29] The perception variable is included in our regressions as a dummy variable rather than a discrete variable; first, because we cannot assume that going from a modality to another is equivalent; second, because firms' perceptions are very polarized towards extreme modalities (46% of firms perceive informal competition as a very severe obstacle, while 27% of firms perceive it as no obstacle). Hence the marginal difference between modalities will not change our interpretation.

ultimately small enterprises (38%) with lower productivity, and located in governorates like Cairo (27%), Sharkiya (13%) and Alexandria (11.7%). They also perceive the severity of corruption and taxes as major obstacles hindering their growth (73% and 71.6% respectively).

The measure of $IRIC_k$ is provided by the estimated coefficient (δ) associated with each governorate (k). If informal competition does not matter in a given governorate, then, its coefficient will not be significant. All governorates dummies report positive and significant coefficients. Hence, compared to firms located in Port-Said, our reference governorate, formal firms located in all other governorates report a higher and significant probability of informal competition intensity being a binding constraint.

Table (2) below presents our first step probit estimation's results. The probability that formal firms perceive less severely the intensity of informal competition slightly increases when their average capacity utilization and the percentage of unionized workers increase. It also strongly increases when the constraints associated with tax rates, corruption practices and finding adequate workforce are alleviated. This is far to be the case in Egypt as around 50% of formal firms included in our sample perceive corruption and tax rates as major and very severe constraints, 40% find it very hard to find an adequate educated workforce, and 76% have no unionized workforce.

Table 2. Governorate-level indicator construction - First step estimation

	Probit estimation
$Total$ annual $fulltime\ permanent\ workers_i$	-0.0000247
	(0.0000)
AGE_i	0.000789
	(0.0018)
$SKILLS_i$	0.113*
	(0.0576)
TAX_i	0.235***
	(0.0635)
COR_i	0.338***
	(0.0651)
CAP_i	-0.00651***
	(0.0018)
EDU_i	0.0152
	(0.0252)
$UNION_i$	-0.00190**
	(0.0009)
$TRAIN_i$	-0.0319
	(0.0718)
Constant	-0.803***
	(0.2400)
Observations	2,770
pseudo R2	0.0654
GOV_k (ref. Port-Said)	YES
Year dummies	YES

Panel ID dummies	YES
Level of se cluster	Region-industry

Notes: the dependent variable $PERCEIVE_i$ is a dummy variable taking the value of one if formal firms perceive the practices of competitors in the informal sector as a binding constraint and zero otherwise. List of variables is provided in table 3.1 (appendix 3). GOV_k is a set of dummies for each governorate included in the sample. The reference governorate is Port-Said. Dummies for interview year and panel ID (number of times each firm is interviewed) are included. Robust standard errors are clustered by region-industry and reported in brackets. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

The second step of Guiso et *al.* (2004)'s methodology consists in providing measures of informal competition intensity by ranking the coefficients (δ) of the governorates dummies included in our probit estimation as reported in table (3) (column 1). We then transform these measures to our indicator (IRIC) by normalizing these coefficients as follows;

$$IRIC_k = \frac{\delta_k}{\max(\delta_k)} \qquad \textbf{(eq.7)}$$

Where, $IRIC_k$ stands for the regional indicator of informal competition for formal firms located in governorate (k), and (δ_k) is the coefficient associated to the governorate (k). This normalized measure creates an indicator varying between zero and one; zero for firms located in governorates less affected by informal competition (*i.e.* Port-Said & Menoufiya), and one for firms located in governorates most affected by informal competition (*i.e.* Qalyubia & Gharbiya).

Table 3. Governorate-level indicator of informal competition intensity ($IRIC_k$)

Governorate (16 groups)	Regional dummy Coefficient	Normalized measure of $IRIC_k$
	(1)	(2)
Port Said	0	0
Menoufiya	0.430**	0.38
Ismailia, Suez & South Sinai	0.539**	0.48
Assiut	0.645***	0.57
Minya	0.695**	0.62
South Upper Egypt (Souhag, Qena, Aswan & Luxor)	0.708**	0.63
Beheira	0.730***	0.65
Sharkiya	0.849***	0.75
Alexandria	0.873***	0.77
Giza	0.883***	0.78
Dakahliya	0.954***	0.85
Cairo	1.020***	0.91
Damietta & Kafr-El-Sheikh	1.022***	0.91
Bani-Suef & Fayoum	1.038***	0.92
Gharbiya	1.104***	0.98
Qualyubia	1.127***	1

Notes: the governorates' dummy coefficients are obtained from a probit estimation of the equation (6) using Egyptian manufacturing WBES in 2004, 2007 and 2008. The $IRIC_k$ is the normalized measure of regional informal competition intensity computed as in equation (7). *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

As reported in table (3) (Column 2), the average of informal competition intensity across governorates is very high (0.8 points). As shown in table (2), this high intensity is mainly driven by

constraints related to corruption, tax rates, and inadequate labour force. These results affirm the strong persistence of informal competition and show to what extent its intensity matters in Egypt (Hypothesis 1).[30]

Reported levels of $IRIC_k$ across governorates confirm our hypothesis claiming the importance of analysing informal competition on a local level (Hypothesis 1). These levels mirror the specificity of each governorate in terms of geographical location, population density and predominant sector of activity. Informal firms are usually more concentrated in capital cities and in big cities surrounding the capital where the highest concentration of labour and demand exist. That's why high intensities of informal competition are reported in Cairo (capital city); in Qalyubia, Gharbiya, Damietta and Kafr-El-Sheikh (Greater Cairo and Delta region surrounding the capital city); and in Bani-Suef and Fayoum (big populated and industrial cities). The reported classification is also in line with the Doing Business indicator (World Bank, 2014). For example, on a scale of 1 to 15, Cairo is ranked first in ease of doing business, but is ranked 13th in ease of registering property. Also Gharbyia is ranked 8th in ease of doing business, but is ranked 14th in ease of registering property (this is similar for Damietta, Alexandria and Giza). That's why these governorates have the highest levels of informal competition.

In fact, criticisms could be made as our indicator $IRIC_k$ does not provide a measure of informal competition on the local market-level, but rather on the governorate-level. This is due to the fact that the Guiso et *al.* (2004)'s methodology requires a minimum of 20 observations per category in order to avoid the insignificance or the drop of estimated parameters in the first step regression (equation 6). Therefore based on our sample that covers 8 industries and 23 governorates, we are not able to construct an indicator of informal competition on the governorate-industry levels because we will have an average of 14 firms per group of governorate-industry that won't be enough for our analysis. Yet, figure 6.1 (appendix 6) shows that if we compare the average perception of formal firms towards informal competition by industry or by industrial zone, we notice that formal firms located in governorates with high $IRIC_k$ (as in Qalyubia and Gharbiya) always report a more severe perception comparing to those located in governorates with low $IRIC_k$ (as in Port-Said and

[30]The reported classification of governorates by informal competition intensity is robust to other specification (for example; the exclusion of some variables (firms' size and obstacle to tax rates) and the exclusion of region-industry clusters and fixed effects).

Menoufyia). Hence, measuring informal competition on other aggregate levels will probably yield to the same results as $IRIC_k$.

5. Results and discussion

We start this section by exploring the results of our benchmark regression. We then solve for the endogeneity and omitted variable biases by adopting an instrumental variable approach and by accounting for the dynamic effect of our indicator. We conclude this section by discussing the results of the difference-in-difference model that identifies the main channel through which informal competition could affect formal firms' productivity.

5.1 Baseline results - The impact of regional informal competition on formal firms' productivity in Egypt

The results of our benchmark regression (equation 1) are reported in table (4) below. Columns (1 to 5) report positive and significant $IRIC_k$ coefficients which means that the higher is the intensity of informal competition in a given governorate, the higher will be the productivity of formal firms located and operating in this given governorate. This remains valid when using different measures of formal firms' productivity (labour productivity (columns 1 & 2) and TFP (column 3)) and when introducing other explanatory variables to the TFP regression (columns 4 & 5).[31] Thus, formal firms located in governorates with high intensity of informal competition outperform those located in governorates with lower intensity of informal competition. This result confirms our hypotheses assuming that informal firms are inherently entrepreneurial and that informal competition might generate positive outcomes to the economy (Hypotheses 2 & 3.a).

The productivity of formal firms depends on other factors that we account for in our model. Our regressions show that small and medium-sized enterprises are better performing comparing to larger ones in terms of the labour productivity measures. This might be linked to the classical standard theory of decreasing marginal labour productivity and also to the importance of small and medium enterprises in Egypt. In contrast, according to the TFP measure, larger firms are more productive compared to smaller firms. This is essentially due to the scale effect taken into consideration in the TFP measure, since larger firms accumulate more capital and use more energy and labour inputs.

[31] Table 7.1 in appendix (7) shows that this result remains also valid when using different fixed effects and clusters with TFP and when introducing the regional average of the perception variable ($PERCEIVE_i$) instead of ($IRIC_k$).

Firms' productivity also increases when firms have more branches or factories, have property and casualty insurance on their assets, are operated with better educated managers, and are located in industrial zones. Comparing to government and private domestic ownerships, firms with Arab and foreign ownerships perform better. Columns (4 & 5) show that firms using higher technology levels and financing their working capital mostly from loans or overdrafts provided by banks report higher and more significant productivity levels (+16% and +25% points respectively), comparing to firms with lower technology levels or financing their working capital mostly from internal earnings or family and friends. Firms' productivity also increases significantly when firms have a saving account (+14% points). However, only 22% of firms in our sample have a saving account, only 15% have a loan from a financial institution and only 9% finance their working capital through banks.

Table 4. Regional informal competition and formal firms' productivity

	Baseline regressions- OLS estimation				
	With labour productivity measures		With TFP measure		
	1	2	3	4	5
$IRIC_k$	0.739***	0.816***	0.396**	0.308**	0.380**
	(0.172)	(0.174)	(0.157)	(0.153)	(0.163)
$SIZE\_small_i$ (ref. large firms)	0.345***	0.225***	-0.222***	-0.208***	-0.145*
	(0.0717)	(0.0796)	(0.0758)	(0.0789)	(0.0785)
$SIZE\_medium_i$ (ref. large firms)	0.227***	0.138*	-0.230***	-0.237***	-0.177**
	(0.0677)	(0.0744)	(0.0714)	(0.0740)	(0.0729)
AGE_i	-0.00310**	-0.00285*	-0.00108	-0.00157	-0.00120
	(0.00138)	(0.00146)	(0.00146)	(0.00152)	(0.00142)
INS_i	0.192***	0.223***	0.135***	0.132***	0.114**
	(0.0461)	(0.0502)	(0.0458)	(0.0491)	(0.0453)
EDU_i	0.0552***	0.0559***	0.0304*	0.0224	0.0310*
	(0.0177)	(0.0197)	(0.0181)	(0.0175)	(0.0174)
$TRAIN_i$	0.114	0.0756	0.0971	0.0709	0.0512
	(0.0730)	(0.0771)	(0.0748)	(0.0806)	(0.0801)
FI_CERT_i	0.0827	0.0680	-0.0599	-0.0587	-0.0607
	(0.0503)	(0.0580)	(0.0524)	(0.0515)	(0.0534)
$FACT_i$	0.148**	0.105	0.152**	0.146**	0.148**
	(0.0655)	(0.0682)	(0.0637)	(0.0674)	(0.0621)
IND_i	0.369***	0.373***	0.238***	0.216***	0.234***
	(0.0561)	(0.0611)	(0.0555)	(0.0599)	(0.0585)
$SHARE_i$(ref. private domestic)					
$SHARE\_arab_i$	0.453***	0.497***	0.462***	0.480***	0.445***
	(0.137)	(0.136)	(0.130)	(0.131)	(0.126)
$SHARE\_foreign_i$	0.443***	0.388**	0.229	0.170	0.181
	(0.163)	(0.169)	(0.159)	(0.180)	(0.181)
$SHARE\_gov_i$	-0.303	-0.275	0.000509	-0.0655	-0.0813
	(0.240)	(0.255)	(0.257)	(0.277)	(0.280)
$SHARE\_other_i$	0.0901	0.0896	-0.204	-0.238	-0.231
	(0.232)	(0.236)	(0.302)	(0.294)	(0.290)
EXP_i	0.00168	0.00101	0.00157	0.00135	0.00148
	(0.00123)	(0.00126)	(0.00118)	(0.00134)	(0.00119)

TEC_i				0.167**	
				(0.0692)	
WK_i (ref. internal earnings)					
WK_bank_i					0.253**
					(0.101)
$WK\_friends_i$					0.0221
					(0.0664)
SAV_i					0.145**
					(0.0732)
Constant	9.351***	9.205***	10.07***	10.13***	10.01***
	(0.198)	(0.210)	(0.187)	(0.185)	(0.187)
Observations	2,988	2,988	2,886	2,698	2,796
R-squared	0.109	0.099	0.089	0.095	0.091
Year dummies	Yes	Yes	Yes	Yes	Yes
Panel ID dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Region Dummies	Yes	Yes	Yes	Yes	Yes

Notes: in column (1), the dependent variable $\ln(PROD1_i)$ is the logarithm of labour productivity measured as the ratio of annual value added to total full-time permanent workers. In column (2), the dependent variable $\ln(PROD2_i)$ is the logarithm of labour productivity measured as the ratio of annual value added to total worker. In column (3-5), the dependent variable is the logarithm of formal firms' TFP. All monetary values are in Egyptian pounds. Columns (4 & 5) account for other firm-level explanatory variables; technology level and access to finance. $IRIC_k$ is the indicator of informal competition intensity measured at the governorate-level (*k*). List of variables is provided in table 3.1 (appendix 3). We control for firm's interview year, the number of times it has been interviewed, industry, and regional location. Non-parametric robust bootstrapped standard errors (1000 replications) are reported in brackets in all columns. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

5.2 Solving endogeneity and omitted variable bias - Instrumental variable approach and IRIC dynamic effect

The baseline results show a significant, positive and stable effect of $IRIC_k$ on formal firms' productivity that remains valid independently of the specification. Yet, this result does not account for the endogeneity of IRIC and for omitted variable bias that might occur due to unobservable characteristics. This section solves these biases by adopting an instrumental variable approach and by accounting for the dynamic effect of $IRIC_k$.

5.2.1 Instrumental variable approach - The 2012 presidential elections' voter turnout

Our specification reveals an endogeneity bias due to the reverse causality that exists between the regional indicator of informal competition intensity and the productivity of formal firms. In order to control for this bias, we instrument our endogenous indicator of informal competition by the voter turnout of the 2012 presidential elections measured at the governorate level (*k*), as explained by equation (8). We include in this regression dummies for regions (α_r), industries (α_s), number of times each firm is interviewed (α_p) and for the year of the interview (α_t). We also introduce clusters by capital city. These controls reduce the number of variables on which we have to rely on (potential omitted variable), as well as the range of possible alternative explanations.

$$\widehat{IRIC_k} = \partial_0 + \partial_1 Voter\_Turnout_k + \partial_2 Z_i + \alpha_r + \alpha_s + \alpha_p + \alpha_t + v_i \quad \textbf{(eq.8)}$$

Where, $Voter\_Turnout_k = \frac{actual\ voters_k}{registered\ voters_k}$

Then we introduce the predicted indicator $\widehat{IRIC_k}$ in our benchmark specification as follows;

$$lnProd_i = \delta_0 + \delta_1 \widehat{IRIC_k} + \delta_2 Z_i + \alpha_r + \alpha_c + \alpha_s + \alpha_p + \alpha_t + \varepsilon_i \quad \textbf{(eq.9)}$$

Where, $lnProd_i$ reflects firms' labour productivity ($\ln(PROD2_i)$) and firms' TFP ($lTFP_i$).

The voter turnout of the 2012 presidential elections is extracted from the Egyptian High Elections Committee website.[32] We choose to use the 2012 presidential elections because they are considered as the most reliable, impartial and free elections Egypt has ever experienced. In addition, the 2012 voter turnout reports large heterogeneity across the governorates included in our sample (from 28.6% to 60.1%). We expect that voter turnout would have a direct and significant effect on the intensity of informal competition. This effect might be negative because citizens tend to less participate to election when the informal sector is legitimate and when the legal system is corrupted (Anderson and Tverdova, 2003). They start to be indifferent towards politics assuming that voting has no political control over the state and politicians. However, this effect might also be positive since corruption and legal distortion might also yield to electoral clientelism (Hermet et *al.*, 1978).

In our sense, we argue that the estimated effect of the voter turnout on the intensity of regional informal competition would be negative for two reasons. First, the existence of a sizeable informal sector in Egypt is a form of popular resistance resulting because of institutional deficiencies and the instability of the economic system (Jütting, 2009), which push people to be more resilient towards their role in the political life. Second, as the 2012 presidential elections were the most credible elections and the first political implications of the 2011's revolution, we argue that it was less subject to political clientelism or to any corruption practices.

Considering the exclusion restriction condition of the instrumental variable approach, $Voter\ Turnout_k$ is considered as a good instrument for $IRIC_k$ since it avoids potential risks of spurious correlation. First, there is no reasons to think that the 2012 voter turnout is correlated with firms' productivity measured in 2004, 2007 or 2008. Second, according to existing literature, Kerwin and Stephens (2011) found no evidence of relation between wages and presidential turnout in major elections. In addition, Blaydes (2006), showed that the voter turnout at the governorate-

[32]The data are available and downloadable through the Egyptian High Elections Committee portal - http://pres2012.elections.eg/

level is not related to the average income per capita in Egypt, which is mainly due to the lack of political liberty and to the existence of strong political clientelism. Hence, we can assume that political participation in Egypt is independently determined from economic growth. Third, according to the statistics, table 8.1 (appendix 8) shows that the statistical correlation between firms' productivity (labour productivity or TFP) and $IRIC_k$ is insignificant and very low. Also, figure 8.1 (appendix 8) shows that the average levels of voter turnout are independently determined from formal firms' productivity. Therefore, we assume that voter turnout measured at the governorate level will not have any direct effect on firms' productivity measured at the firm-level.

As expected, the first stage results, reported in table (5) below, show a negative effect of voter turnout on the intensity of informal competition (columns 2 & 5). A higher intensity of informal competition reflects a stronger and larger informal sector that challenges institution legitimacy and undermines the rule of law and governance. In such corrupted environment, people are no longer motivated to participate into the political life. The reason is simple; why should we vote if the regulations are not respected? Hence the dominant behaviour is the exit strategy. As highlighted by Blaydes (2006, p.19) "*Voter abstention signals a protest of the political system and opposition newspapers use low turnout figures as evidence of lack of political trust in the regime*."

Considering the second stage regression (table 5 - columns 3 & 6), the predicted regional indicator of informal competition intensity reports a positive and significant effect on formal firms' productivity. Hence, our benchmark results are still valid and consistent when solving for the endogeneity issue. Comparing to the benchmark results, the instrumental variable approach reports a stronger $IRIC_k$ coefficient, which means that ignoring endogeneity issues underestimates the effect that $IRIC_k$ could has on formal firms' productivity. However, the coefficient is almost twice stronger which might reflect the weakness of our instrumental variable approach due to unobservable regional effect. That's why the next section emphasizes the dynamic effect of IRIC in order to validate this last result.

Table 5. Instrumental variable estimation

	With labour productivity measure			With TFP measure		
	OLS estimation	IV estimation		OLS estimation	IV estimation	
	Baseline regressions (table 4, col.2)	First stage	Second stage	Baseline regressions (table 4, col.3)	First stage	Second stage
	(1)	(2)	(3)	(4)	(5)	(6)
$IRIC_k$	0.816***			0.396**		
	(0.174)			(0.157)		
$\widehat{IRIC_k}$			2.000***			1.432***
			(0.654)			(0.440)
Instrument		-0.00800***			-0.00836***	
$Voter\_Turnout_k$		(0.00235)			(0.00249)	
$SIZE\_small_i$ (ref.	0.225***	-0.00948**	0.241***	-0.222***	-0.00965*	-0.208***
large firms)	(0.0796)	(0.00480)	(0.0330)	(0.0758)	(0.00504)	(0.0122)
$SIZE\_medium_i$	0.138*	-0.00804***	0.148***	-0.230***	-0.00925***	-0.220***
(ref. large firms)	(0.0744)	(0.000557)	(0.0374)	(0.0714)	(0.00104)	(0.0382)
AGE_i	-0.00285*	0.000784*	-0.00371***	-0.00108	0.00075**	-0.0018***
	(0.00146)	(0.000404)	(0.000454)	(0.00146)	(0.000372)	(0.000480)
INS_i	0.223***	-0.00641***	0.232***	0.135***	-0.00255***	0.138***
	(0.0502)	(0.00150)	(0.0214)	(0.0458)	(0.000814)	(0.0160)
EDU_i	0.0559***	0.00256**	0.0527**	0.0304*	0.00215**	0.0280*
	(0.0197)	(0.00129)	(0.0222)	(0.0181)	(0.000963)	(0.0158)
$TRAIN_i$	0.0756	-0.0274***	0.104	0.0971	-0.0259**	0.120
	(0.0771)	(0.00995)	(0.0730)	(0.0748)	(0.0103)	(0.0737)
FI_CERT_i	0.0680	0.0331*	0.0277	-0.0599	0.0283	-0.0899*
	(0.0580)	(0.0197)	(0.0278)	(0.0524)	(0.0176)	(0.0501)
$FACT_i$	0.105	0.0120***	0.0932***	0.152**	0.0118***	0.143***
	(0.0682)	(0.00205)	(0.00504)	(0.0637)	(0.00196)	(0.0139)
IND_i	0.373***	-0.0309***	0.409***	0.238***	-0.0326***	0.271***
	(0.0611)	(0.00408)	(0.0278)	(0.0555)	(0.00454)	(0.0348)
$SHARE_i$(ref. private domestic)						
$SHARE\_arab_i$	0.497***	0.0288	0.467***	0.462***	0.0310	0.434***
	(0.136)	(0.0228)	(0.145)	(0.130)	(0.0240)	(0.0992)
$SHARE\_foreign_i$	0.388**	-0.0181	0.412*	0.229	-0.0188	0.250
	(0.169)	(0.0187)	(0.235)	(0.159)	(0.0189)	(0.215)
$SHARE\_gov_i$	-0.275	-0.0597**	-0.210***	0.000509	-0.0592**	0.0583
	(0.255)	(0.0266)	(0.0433)	(0.257)	(0.0272)	(0.111)
$SHARE\_other_i$	0.0896	-0.000760	0.0914***	-0.204	-0.00472	-0.201***
	(0.236)	(0.0179)	(0.0311)	(0.302)	(0.0220)	(0.0193)
EXP_i	0.00101	0.000151***	0.000932*	0.00157	0.000119***	0.00154***
	(0.00126)	(5.68e-05)	(0.000494)	(0.00118)	(4.19e-05)	(0.000200)
Constant	9.205***	1.260***	8.217***	10.07***	1.280***	9.207***
	(0.210)	(0.0751)	(0.457)	(0.187)	(0.0830)	(0.326)
Observations	2,988	2,988	2,988	2,886	2,886	2,886
R-squared	0.099	0.2944	0.083	0.089	0.2935	0.075
F-test of first stage		44.10 {0.0000}			42.38 {0.0000}	
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Panel ID dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

Region dummies	Yes	Yes	Yes	Yes	Yes	Yes
Level of se cluster	-	Capital-city		-	Capital-city	

Notes: Columns (1 & 3), the dependent variable $\ln(PROD2_i)$ is the logarithm of value added to total workers. Columns (4 & 6), the dependent variable is the logarithm of formal firms' TFP. All monetary values are in Egyptian pounds. Columns (2 & 5), the dependent is the indicator of informal competition intensity measured at the governorate-level ($IRIC_k$). $\widehat{IRIC_k}$ is the predicted value of $IRIC_k$ instrumented using $Voter\_Turnout_k$. List of variables is provided in table 3.1 (appendix 3). We control for firms' interview year, the number of times each firm has been interviewed, industries, and regional location. F-test of first stage is the test statistic of the significance of the instrument in the first-stage regressions, with p-values in braces. Robust standard errors in the IV estimation are clustered at the capital city level and are reported in brackets in all columns. Standard errors are bootstrapped using 1000 replications in OLS estimation. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

5.2.2 IRIC dynamic effect

Due to the limited number of followed up firms across years (see table 4.1, appendix 4), we are not able to implement a panel estimation. However, the panel dimension of this dataset can be used to eliminate all the unobservable regional and time effects altering our previous results. We do so by replicating Guiso et *al* (2004)'s methodology used in section (4.2), to construct a new indicator of informal competition intensity on a yearly-governorate level ($IRIC\_yr_{k,t}$). First, we modify equation (6) by introducing couples of governorate-year dummies (GOV_YEAR_{kt}) as shown in equation (10) below. The measure of ($IRIC\_yr_{k,t}$) is provided by the coefficient ($\emptyset$) associated with each couple of governorate-year. All reported coefficients are significant and positive comparing to the reference category Port-Said-2008 (the one reporting the smallest number of firms perceiving informal competition as a binding constraint). Second, we normalize the reported coefficients using equation (11) below.[33]

$$PERCEIVE_i = \alpha_0 + \alpha_1 X_i + \emptyset\, \boldsymbol{GOV\_YEAR_{kt}} + D_p + D_t + \epsilon_i \qquad \textbf{(eq.10)}$$

$$\boldsymbol{IRIC\_yr_{k,t}} = \frac{\emptyset_{kt}}{\max(\emptyset_{kt})} \qquad \textbf{(eq.11)}$$

Then we include the constructed $\boldsymbol{IRIC\_yr_{k,t}}$ in our benchmark productivity equation (1) by adding governorates dummies ($\boldsymbol{\alpha_k}$) as follows;

$$lnProd_i = \boldsymbol{\beta_0 + \beta_1 IRIC\_yr_{k,t} + \beta_2 Z_i + \alpha_k + \alpha_s + \alpha_p + \varepsilon_i} \qquad \textbf{(eq.12)}$$

Where, $lnProd_i$ reflects firms' labour productivity ($\ln(PROD2_i)$) and firms' TFP ($lTFP_i$).

The results presented in table (6), columns (2 & 4), show that eliminating regional unobservable factors generates - once more - a positive and highly significant coefficient of $IRIC\_yr_{k,t}$. The

[33] Table 9.1 (appendix 9), reports the ranking of the intensity of informal competition across governorates and years $\boldsymbol{IRIC\_yr_{k,t}}$. As reported in table 9.2 (appendix 9), on average per governorate, the ranking of $\boldsymbol{IRIC\_yr_{k,t}}$ is almost the same as $\boldsymbol{IRIC_k}$.

higher is the intensity of informal competition in governorate (k) and year (t), the higher is the productivity of formal firms located in this given governorate and interviewed during this given year. The reported $\boldsymbol{IRIC\_yr_{k,t}}$ coefficient proves again the underestimation of the $\boldsymbol{IRIC_k}$ coefficients resulted by the benchmark estimation due to endogeneity issues. It also proves the overestimation of the $\boldsymbol{IRIC_k}$ coefficients resulted by the instrumental variable estimation due to uncontrolled unobservable regional factors. Therefore, we can testify that accounting for IRIC dynamic effects generates the most credible results that accounts for both endogeneity issues and omitted variables biases. We can also prove one more time that we are in line with our hypotheses assuming the beneficial effects of informal competition (Hypotheses 2 and 3.a).

Table 6. IRIC dynamic effect and formal firms' productivity

	OLS estimations			
	With labour productivity measure		With TFP	
	Baseline regression (table 4, col.2)	Dynamic effect	Baseline regression (table 4, col.3)	Dynamic effect
	1	2	3	4
$IRIC_k$	0.816***		0.396***	
	(0.163)		(0.149)	
$IRIC\_yr_{k,t}$		1.071***		0.786**
		(0.414)		(0.384)
$SIZE\_small_i$ (ref. large firms)	0.225***	0.226***	-0.222***	-0.215***
	(0.0814)	(0.0814)	(0.0754)	(0.0789)
$SIZE\_medium_i$ (ref. large firms)	0.138*	0.151**	-0.230***	-0.214***
	(0.0740)	(0.0746)	(0.0694)	(0.0742)
AGE_i	-0.00285**	-0.00182	-0.00108	-0.000351
	(0.00143)	(0.00143)	(0.00143)	(0.00137)
INS_i	0.223***	0.237***	0.135***	0.143***
	(0.0496)	(0.0514)	(0.0463)	(0.0485)
EDU_i	0.0559***	0.0632***	0.0304*	0.0375**
	(0.0197)	(0.0202)	(0.0179)	(0.0178)
$TRAIN_i$	0.0756	0.0786	0.0971	0.0928
	(0.0763)	(0.0802)	(0.0779)	(0.0789)
FI_CERT_i	0.0680	0.0199	-0.0599	-0.0982*
	(0.0575)	(0.0601)	(0.0526)	(0.0548)
$FACT_i$	0.105	0.0421	0.152**	0.0957
	(0.0666)	(0.0679)	(0.0639)	(0.0625)
IND_i	0.373***	0.446***	0.238***	0.318***
	(0.0597)	(0.0631)	(0.0577)	(0.0584)
$SHARE_i$(ref. private domestic)				
$SHARE\_arab_i$	0.497***	0.499***	0.462***	0.463***
	(0.132)	(0.139)	(0.127)	(0.130)
$SHARE\_foreign_i$	0.388**	0.392**	0.229	0.231
	(0.176)	(0.173)	(0.163)	(0.166)
	-0.275	-0.315	0.000509	-0.0310

$SHARE\_gov_i$	(0.242)	(0.267)	(0.251)	(0.268)
$SHARE\_other_i$	0.0896	0.131	-0.204	-0.202
	(0.240)	(0.224)	(0.296)	(0.291)
EXP_i	0.00101	0.00123	0.00157	0.00182
	(0.00134)	(0.00134)	(0.00114)	(0.00116)
Constant	9.205***	8.992***	10.07***	9.727***
	(0.200)	(0.322)	(0.178)	(0.284)
Observations	2,988	2,988	2,886	2,886
R-squared	0.099	0.088	0.089	0.078
Year dummies	Yes	No	Yes	No
Panel ID dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Region dummies	Yes	No	Yes	No
Governorate dummies	No	Yes	No	Yes

Notes: in columns (1 & 2), the dependent variable $\ln(PROD2_i)$ is the logarithm of labour productivity measured as the ratio of annual value added to total workers. In columns (3 & 4), the dependent variable is the logarithm of formal firms' TFP. All monetary values are in Egyptian pounds. $IRIC_k$ is the indicator of informal competition intensity measured at the governorate-level (*k*). $IRIC\_yr_{k,t}$ is the indicator of informal competition intensity measured at the governorate-year-level (*k,t*). List of variables is provided in table 3.1 (appendix 3). We control for firm's interview year, the number of times it has been interviewed, industry, and regional location. Non-parametric robust bootstrapped standard errors (1000 replications) are reported in brackets in all the columns. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

5.3 Difference-in-difference - Informal competition and the 2005 new tax law

Our hypothesis (3.b) assumes that the differential in costs between formal and informal firms in Egypt is the main channel through which informal firms are able to exert a competitive pressure on formal ones. Therefore, if the differential in costs shrinks (informal firms' cost advantage get smaller or/and formal firms' costs get reduced) formal firms will be more prompt to regain their market shares and to increase their productivity. In order to test the validity of this hypothesis, this section evaluates the effectiveness of the 2005 new tax law (No.91/2005) - a new unified corporate and income tax law - using a difference-in-difference model.

After many years of high tax rates in Egypt, tax evasion became the norm which created mutual distrust between tax payers and tax authorities. The main objective of the 2005 new tax law was to downsize the informal sector by reducing tax rates, improving tax collection, protecting tax payers' rights and creating more transparent and uncorrupted tax administration procedures. That's why it was expected that tax revenues will be reduced dramatically. However, the number of tax payers increased from 1.7 million in 2005 to over 2.5 million in 2006, adding 610k returns during the first year of the reform (Ministry of Finance, 2007 and Ramalho, 2007). Revenues from personal taxes in fiscal year 2005-2006 were up to EGP 1bn ($173m) comparing to EGP 400m ($69.5m) in the

previous year. Corporate tax also increased by EGP 3bn ($521m) (African Development Bank, 2009).[34]

These facts prove that the new tax law succeeded in increasing the number of taxable firms and people. It also helped existing formal firms to reduce their costs by decreasing corporate and personal taxes. Hence, this law succeeded in reducing the size of the informal sector as well as the differential in costs between formal and informal firms. According to the context of this chapter, we assume that firms located in areas with high intensity of informal competition are differently affected by the law comparing to those located in areas with low intensity of informal competition. Therefore, we use a difference-in-difference model to answer the following question;
How did the 2005 tax law affect the productivity of formal firms located in areas with high or low informal competition intensities?

To do so we start by dividing our sample of firms into two groups. The pre-intervention group that includes formal firms interviewed before the implementation of the law (2004 sample = 938 firms, $t = 0$) and the post-intervention group that includes formal firms interviewed after the implementation of the law (2007 and 2008 samples = 2082 firms, $t = 1$). Then, we divide the post-intervention group into two sub groups to compare formal firms located in governorates with high intensity of informal competition to those located in governorates with low intensity of informal competition. Last, as we use a pooled sample of firms interviewed over three different years, we consider firms followed (re-interviewed) after the 2004 round as treated. Thus our treatment group accounts for formal firms interviewed after 2004 and located in governorates with high informal competition intensity ($T = 1$).

In order to identify the sub groups of firms located in governorates with high or low intensity of informal competition, we use as thresholds the first, second and third quartiles of the governorate-year level indicator of informal competition $IRIC\_yr_{k,t}$ (equation 11). According to the 1st quartile's cut-off, firms are considered located in governorates with high informal competition intensity if $IRIC\_yr_{k,t}$ is higher than or equal to 0.77, which corresponds to 82% of the sample being treated. With the 2nd and 3rd quartile these numbers are respectively; 0.80 which corresponds to 78% of the sample being treated; and 0.85 which corresponds to 63% of the sample being treated.

[34] See appendix (10) for more information about the 2005 tax law.

We estimate the following model;

$$ln(TFP_i) = \alpha + \beta T_{i1} t + \delta T_{i1} + \partial t + \emptyset X_i + \alpha_s + \alpha_r + \alpha_p + \varepsilon_i \quad \textbf{(eq.13)}$$

Where, $ln(TFP_i)$ is the logarithm of formal firms' TFP. T_{i1} refers to the treatment group that we define as formal firms located in areas with high intensity of informal competition (*T*=1), whilst the comparison group are those located in areas with low intensity of informal competition (*T*=0). *t* is a time dummy and refers to the post policy change period and gets the value of *t*=1 for 2007-2008 and *t*=0 for 2004. X_i is a vector of firm specific characteristics. We also include fixed effects to control for unobserved industries-specific (α_s), regions-specific (α_r) and panel-specific (α_p) factors that might affect our dependent variable. We also cluster our regression by governorates. The effect of the 2005 new tax law on the productivity of formal firms located in areas with high intensity of informal competition is reported by our coefficient of interest (β). Table (7) reports a positive and significant effect of this coefficient. Thus, thanks to the implementation of the 2005 new tax law, the productivity of formal firms located in governorates with moderate to high intensity of informal competition increases significantly up to 25% points (first and second $IRIC\_yr_{k,t}$ quartiles). However, the productivity of firms located in governorates with very high intensity of informal competition (third quartile) is not significantly affected by the new law.

This result verifies our hypothesis assuming that informal firms' cost advantage is the main channel through which informal firms exert a competitive pressure on formal firms that would help them in boosting their productivity (Hypothesis 3). In a context of high intensity of informal competition, the reduction of tax rates and the alleviation of tax administration procedures allow formal firms to overcome informal firms' cost advantage and to improve their productivity. This conclusion adds to the findings of Wahba and Assaad (2015) who showed that the 2003 new labour law that allowed more flexible labour market regulation, had a positive effect on the incidence of formal employment. It also highlights the importance of integrating the informal sector into undertaken policies and reforms.

However, this methodology do not allow us to clearly show the impact of the intensity of informal competition on formal firms' costs structure, which might add more robustness to our analysis. In addition, our results might be driven by the effect of other reforms implemented during the period of the surveys (2004-2008). Though, two main other reforms mark this period; the reduction of tariff in 2004 and the enactment of the 2005 protection of competition and prohibition of monopolistic practices law. The first was approved as a part of the 2005 tax reform agenda, already

considered in our analysis. And the second was mainly targeting formal firms competition behaviours among each other and informal firms was not subject to this law by any mean.

Table 7. Difference-in-difference model - the effect of the 2005 new tax law on formal firms' TFP

	1st quartile	2nd quartile	3rd quartile
Treatment group (δ)	0.101*	0.157***	0.126**
	(0.0481)	(0.0299)	(0.0492)
Post intervention (∂)	-0.214***	-0.211**	0.0129
	(0.0689)	(0.0837)	(0.138)
Treatment group*post intervention (β)	0.224**	0.225**	-0.0359
	(0.0793)	(0.0899)	(0.158)
$SIZE\_small_i$ (ref. large firms)	-0.223***	-0.215***	-0.239***
	(0.0440)	(0.0470)	(0.0535)
$SIZE\_medium_i$ (ref. large firms)	-0.198***	-0.190***	-0.204***
	(0.0501)	(0.0513)	(0.0546)
AGE_i	-0.000394	-0.000280	-0.000103
	(0.00151)	(0.00149)	(0.00140)
INS_i	0.142***	0.136***	0.135***
	(0.0374)	(0.0369)	(0.0366)
EDU_i	0.0334	0.0336	0.0349
	(0.0197)	(0.0193)	(0.0202)
$TRAIN_i$	0.114	0.111	0.100
	(0.104)	(0.105)	(0.104)
FI_CERT_i	-0.0826	-0.0895	-0.0794
	(0.0543)	(0.0550)	(0.0534)
$FACT_i$	0.0929	0.0904	0.0970
	(0.0901)	(0.0916)	(0.0924)
IND_i	0.249***	0.248***	0.241***
	(0.0564)	(0.0552)	(0.0570)
$SHARE_i$(ref. private domestic)			
$SHARE\_arab_i$	0.465***	0.456***	0.471***
	(0.151)	(0.153)	(0.153)
$SHARE\_foreign_i$	0.225	0.227	0.241
	(0.237)	(0.236)	(0.238)
$SHARE\_gov_i$	-0.0704	-0.0226	-0.0743
	(0.287)	(0.291)	(0.297)
$SHARE\_other_i$	-0.215	-0.192	-0.199
	(0.350)	(0.354)	(0.351)
EXP_i	0.00189	0.00182	0.00190
	(0.00121)	(0.00122)	(0.00121)
$Cairo_i$ (ref. all other governorate)	-0.0101	-0.0322	-0.00940
	(0.0590)	(0.0549)	(0.0663)
Constant	10.31***	10.31***	10.30***
	(0.101)	(0.100)	(0.104)
Observations	2,886	2,886	2,886
R-squared	0.071	0.074	0.068
Panel ID dummies	yes	yes	Yes
Industry dummies	Yes	yes	yes
Level of se cluster	Governorates	Governorates	Governorates

Notes: the dependent variable is the logarithm of formal firm's TFP. All monetary values are in Egyptian pounds. Treatment group is a dummy variable taking the value of one for firms having a high level of informal competition intensity ($IRIC\_yr_{k,t}$ higher than or equal its 1st quartile>=0.77, its 2nd quartile>=0.8 and its 3rd quartile>=0.85) and zero otherwise. Post intervention is a time dummy and refers to the post policy change period and gets the value of

t=1 for 2007-2008 and t=0 for 2004. List of variables is provided in table 3.1 (appendix 3). We control for firm's number of times it has been interviewed, and industry. Robust standard errors clustered at the governorate level are reported in brackets in all the columns. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

6. Conclusion

This chapter investigates the effect of regional competition stemming from informal firms on the productivity of formal firms in the Egyptian manufacturing sector. We update the two-step methodology of Guiso et *al.* (2004) to construct a regional indicator of informal firms' competition intensity using the Egyptian manufacturing WBES over the period 2004, 2007 and 2008. We start our analysis by estimating the effect of the constructed indicator of regional informal competition on the productivity of formal firms using an ordinary least square estimation. Then we verify our first results by adopting an instrumental variable approach and by emphasizing the dynamic effect of the constructed indicator. Finally, we identify the channel through which informal competition affects formal firms' productivity based on a difference-in-difference model.

We provide evidences that informal competition can be a powerful incentive for formal enterprises. Our constructed regional indicator of informal competition reports a stable and significant positive effect on formal firms' productivity. This positive and significant effect remains valid in all specifications and when solving for endogeneity and omitted variables biases. Our result contributes to existing literature by showing empirically that informal competition matters and contributes positively to the economy. Therefore, we advocates that informal firms could allow a better exploitation of economic resources and are inherently entrepreneurial.

The second main contribution of this chapter is that we identify informal firms' cost advantage as the main channel through which regional informal competition would affect formal firms' productivity. Our estimation shows that the reduction of tax rates and the alleviation of tax procedures increase significantly the productivity of formal firms located in governorates with moderate to high intensity of informal competition. In countries with large informal sector, the implementation of effective reforms and regulation allows the reduction of the cost differential between formal and informal firms, enabling formal firms to improve their productivity and regain their market shares.

Our results allow us to draw some interesting policy implications. The findings of this chapter suggest that the Egyptian government should recognise the importance of informal firms and integrate them into undertaken policies as an effective economic actor rather than a threat. The government should also consider this sector as an efficient sub-sector that helps larger and more productive firms in providing materials and services. In addition, authorities need to be persuaded

that the formalization process will be socially accepted when associated with substantial reforms, *i.e.* concrete willingness to solve institutional imperfections and to provide a more friendly business environment.

References

African Development Bank. (2009). *Egypt private sector country profile.* Abidjan, Côte d'Ivoire: African Development Bank Group

Ali, N. (2014). L'informalité des micro-et petites entreprises en Égypte: une analyse transversale. *Mondes en développement*, *166*(2), 87-100.

Amor-s, J., Couyoumdjian, J., Cristi, O., & Minniti, M. (2016). The bottom-up power of informal entrepreneurship. In Sauka, S., Schneider, F., & Williams, C. C. (Eds.). *The bottom-up power of informal entrepreneurship* (pp. 9-29). Cheltenham, UK: Edward Elgar Publishing.

Anderson, C. J., & Tverdova, Y. V. (2003). Corruption, political allegiances, and attitudes toward government in contemporary democracies. *American Journal of Political Science*, *47*(1), 91-109.

Assaad, R. (2009). Labor supply, employment, and unemployment in the Egyptian economy, 1988-2006. In Assaad, R. (Eds.). *The Egyptian Labor Market Revisited* (pp. 1-52).Cairo, Egypt: the American University in Cairo Press.

Avirgan, T., Gammage, S., & Bivens, J. (Eds.). (2005). *Good jobs, bad jobs, no jobs: Labor markets and informal work in Egypt, El Salvador, India, Russia, and South Africa*. Washington, DC: Global Policy Network.

Bagayev, I., & Najman, B. (2014). *Money to fill the gap? Local financial development and energy intensity in Europe and Central Asia* (No. 55193). University Library of Munich, Germany.

Blaydes, L. (2006, August). Who votes in authoritarian elections and why? Determinants of voter turnout in contemporary Egypt. Paper presented at Annual Meeting of the American Political Science Association, Philadelphia, PA.

Central Bank of Egypt (2014). *Annual report 2013/2014*. Retrieved from www.cbe.org.eg/en/.../Publications/AnnualReportDL/Annual%20Report2013-2014.pdf

Charmes, J. (2000). *Informal sector, poverty and gender: A review of empirical evidence*. Washington, DC: World Bank.

Charmes, J. (2012). The informal economy worldwide: trends and characteristics. Margin: *The Journal of Applied Economic Research, 6*(2), 103-132.

De Soto, H. (1990). *The other path: The invisible revolution in the third world*. New York: Harper and Row.

De Soto, H. (2000). *The mystery of capital: Why capitalism triumphs in the West and fails everywhere else*. New York: Basic books.

Djankov, S., Miguel, E., Qian, Y., Roland, G., & Zhuravskaya, E. (2004). Who are Russia's entrepreneurs? *Journal of the European Economic Association*, *3*(2-3), 587–597.

Duchêne, G., & Rusin, P. (2002). Micro-entreprises, croissance et mutations de l'emploi dans les pays en transition. Revue économique, *53*(3), pp. 637-646.

El-Fattah, M. A. A. (2012). A survey-based exploration of satisfaction and profitability in Egypt's informal sector. (ECES Working Paper No. 169). Cairo, Egypt: Egyptian Center for Economic Studies.

El-Hamidi, F. (2011). How do women entrepreneurs perform? Empirical evidence from Egypt. (ERF Working Paper No. 621). Cairo, Egypt: Economic Research Forum

El Mahdi, A. (2000). The labor absorption capacity of the informal sector in Egypt. Minneapolis: Minnesota Population Center, University of Minnesota.

Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank.

Friesen, J., & Wacker, K. (2013). Do Financially Constrained Firms Suffer from More Intense Competition by the Informal Sector? Firm-Level Evidence from the World Bank Enterprise Surveys. (Discussion Paper No. 139). Göttingen, Germany: Courant Research Centre.

Galal, A. (2004). The economics of formalization: Potential winners and losers from formalization in Egypt.

(ECES Working Paper No. 95). Cairo, Egypt: Egyptian Center for Economic Studies.

Gonzalez, A. S., & Lamanna, F. (2007). *Who fears competition from informal firms? Evidence from Latin America* (Report No. 4316). Washington, DC: The World Bank.

Guiso, L., Sapienza, P., & Zingales, L. (2004). Does local financial development matter?. *The Quarterly Journal of Economics*, *119*(3), 929–969.

Gülbiten, Ö., & Taymaz, E. (2000). Are Small Firms Inefficient? A Schumpeterian Analysis of Productivity Differentials. *Department of Economics, Middle East Technological University, Ankara*.

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: a two-sector analysis. *The American economic review*, *60*(1). 126-142.

Hart, K. (1973). Informal income opportunities and urban employment in Ghana. *The journal of modern African studies*, *11*(01), 61-89.

Hermet, G, Richard, R, & Alain, R. (1978). Elections without Choice. New York, NY: Wiley.

International Labour Office. (1972). *Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya*. Geneva, Switzerland: International Labour Office.

International Labour Office. (2012). *Statistical update on employment in the informal economy*. Geneva, Switzerland: International Labour Office.

Jütting, J. (2009). *Is informal normal?: towards more and better jobs in developing countries*. Jütting, J. &. De Laiglesia, J. R. (Eds.). Paris, France: Development Centre of the Organisation for Economic Co-operation and Development.

Kerwin, K. C., & Stephens Jr, M. (2011). Employment, Wages and Voter Turnout. (NBER Working Paper Series No. 17270). Cambridge, MA: National Bureau of Economic Research.

La Porta, R. L., & Shleifer, A. (2008). The unofficial economy and economic development. *Brookings Papers on Economic Activity, 2008*(2), 275-363.

La Porta, R., & Shleifer, A. (2014). Informality and Development. *Journal of Economic Perspectives*, *28*(3), 109-126.

Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *Review of Economic Studies, 70*(2): 317-342.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester school*, *22*(2), 139-191.

Maloney, W. F. (2004). Informality revisited. *World development*, *32*(7), 1159-1178.

Ministry of Finance. (2007). *MENA-OECD Investment program WG3: Tax policy for investment, Egyptian tax reform agenda.* Cairo, Egypt: Ministry of finance.

OAMDI, 2013. Labor Market Panel Surveys (LMPS), http://www.erf.org.eg/cms.php?id=erfdataportal. Version 2.1 of Licensed Data Files; ELMPS 2012. Egypt: Economic Research Forum (ERF).

Organisation for Economic Cooperation and Development. (2009). *Competition Policy and the Informal Economy*. Paris, France: OECD.

Organisation for Economic Cooperation and Development. (2011). *Measuring Productivity: measurement of aggregate and industry-level productivity growth*. Paris, France: OECD.

Ramalho, R (2007). *Adding a million taxpayers*. Washington, DC: World Bank.

Rauch, J. E. (1991). Modelling the informal sector formally. *Journal of development Economics*, *35*(1), 33-47.

Schneider, F., Buehn, A., & Montenegro, C. E. (2010). Shadow Economies all over the World: New Estimates for 162 Countries from 1999 to 2007. (Policy Research Working Paper Series No. 5356). Washington, DC: The World Bank.

Schneider, F., & Enste, D. (2000). Shadow economies around the world-size, Causes, and Consequences. (IMF working paper No. 0026). Washington, DC: International Monetary Fund.

Saviotti, P. P., & Pyka, A. (2008). Product variety, competition and economic growth. *Journal of Evolutionary Economics*, *18*(3-4), 323-347.

Selwaness, I., & Zaki, C. (2013). Assessing the impact of Trade reforms on Informality in Egypt. (ERF Working Paper No. 759). Cairo, Egypt: Economic Research Forum.

Villegas-Sanchez, C. (2009). FDI spillovers and the role of local financial markets: evidence from Mexico. *Manuscript, University of Houston*.

Voter Turnout dataset (http://pres2012.elections.eg/). The Egyptian High Elections Committee.

Wahba, J., & Assaad, R. (2015). Flexible Labor Regulations and Informality in Egypt. (ERF Working Paper No. 915). Cairo, Egypt: Economic Research Forum.

Wahba, J. (2009). Informality in Egypt: a stepping stone or a dead end?. (ERF Working Paper No. 456). Cairo, Egypt: Economic Research Forum.

Webb, J. W., Bruton, G. D., Tihanyi, L., & Ireland, R. D. (2013). Research on entrepreneurship in the informal economy: Framing a research agenda. *Journal of Business Venturing*, *28*(5), 598-614

Webb, J. W., Tihanyi, L., Ireland, R. D., & Sirmon, D. G. (2009). You say illegal, I say legitimate: Entrepreneurship in the informal economy. *Academy of Management Review*, *34*(3), 492-510.

Williams, C. C., Martinez-Perez, A., & Kedir, A. M. (2016). Informal entrepreneurship in developing economies: the impacts of starting-up unregistered on firm performance. *Entrepreneurship Theory and Practice*.

World Bank (2014). *Doing Business report in Egypt: Understanding Regulations for Small and Medium-Size Enterprises.* Washington, DC: World Bank.

World Development Indicators. Washington, DC: World Bank.

Worldwide Governance Indicators (www.govindicators.org).

Appendices

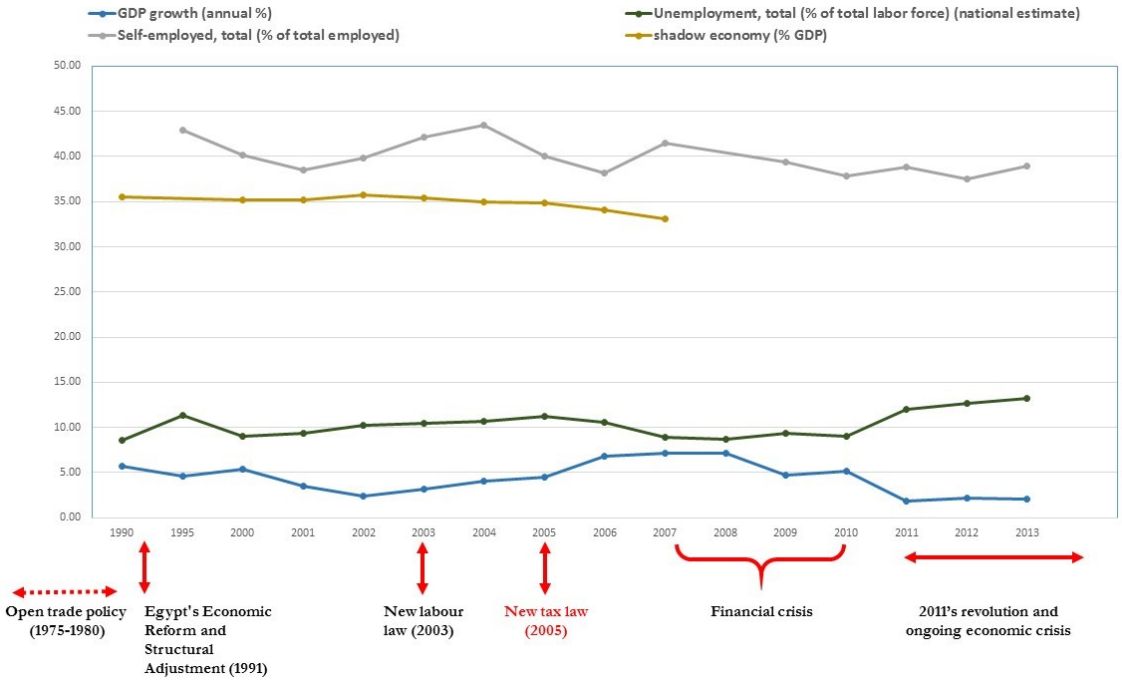
Appendix 1

Table 1.1. MENA countries' main economic characterisctics

Country	Informal employment (% of total non-agricultural employment)	Informal economy (% of GDP)	Youth unemployment, (% of total labour force ages 15-24)	Unemployment, total (% of total labour force)	GDP growth (%)	Poverty headcount ratio (% of population)	Ease of Doing Business index (ranking)	Control of Corruption	Regulatory Quality	Formal firms competing against informal firms (%)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Algeria	37.7 (2012)	34.3	25.3 (2014)	10.6 (2014)	3.2	5.5 (2011)	156	-0.68	-1.16	66.8 (2007)
Egypt	49.6 (2012)	34.9	34.3 (2013)	13.2 (2013)	4.3	25.2 (2010)	122	-0.55	-0.79	47.9 (2013)
Jordan	-	18.5	29.3 (2012)	12.6 (2013)	4.8	14.4 (2010)	118	0.25	0.04	20.6 (2013)
Lebanon	**51.8 (2000/2007)**	33.1	22.1 (2007)	9 (2007)	4.47	27.4 (2012)	126	-0.87	-0.27	57.1 (2013)
Morocco	71.5 (2012)	34.9	20 (2014)	9.9 (2014)	4.3	8.9 (2007)	68	-0.24	-0.17	47.3 (2013)
Oman	-	18.4	-	**7.2 (2014)**	4.74	-	66	0.2	0.58	-
Tunisia	33.9 (2012)	37.2	37.6 (2012)	15.9 (2013)	3.19	15.5 (2010)	77	-0.11	-0.39	45.2 (2013)
United Arab Emirates	-	25.9	12.1 (2008)	4.2 (2009)	3.72	-	26	1.12	1.13	-
Yemen	**51.1 (2000/2007)**	27.1	33.7 (2010)	17.8 (2010)	-0.58	34.8 (2005)	179	-1.44	-1.1	43 (2013)

Notes: column (1) presents the percentage of informal employment in total non-agricultural employment for the last available year (between brackets). Data are from Charmes (2012) and data in bold are from Jütting (2009). Column (2) presents the percentage of informal economy in official GDP (period average 1999-2007). Data are from Schneider et *al.* (2010). Column (3) presents the national estimates of the share of youth unemployment in total labour force (ages 15-24) for the last available year (between brackets). Column (4) presents the national estimates (modelled ILO estimate in bold) of the share of total unemployment in total labour force for the last available year (between brackets). Column (5) presents the percentage of annual GDP growth for the period average 2005-2015. Column (6) presents the poverty headcount ratio at national poverty lines in percentage of population for the last available year (between brackets). Column (7) presents the 2016's ease of doing business index (1=most business-friendly regulations). Data in columns (3-7) are from the World Development Indicators. Columns (8 & 9) present the 2015's control of corruption and regulatory quality estimates (-2.5 to 2.5). Data are from the Worldwide Governance indicators. Column (10) presents the percentage of firms competing against unregistered or informal firms for the last available year (between brackets). Data are form the World Bank Enterprise Surveys. Table computed by the authors.

Figure 1.1. GDP growth, unemployment, self employment and informal economy in Egypt



Notes: data on GDP growth, unemployment and self-employment are from the World Development Indicators. Data on the informal economy are from Schneider (2012). Graph created by the authors.

Appendix 2 Sample design

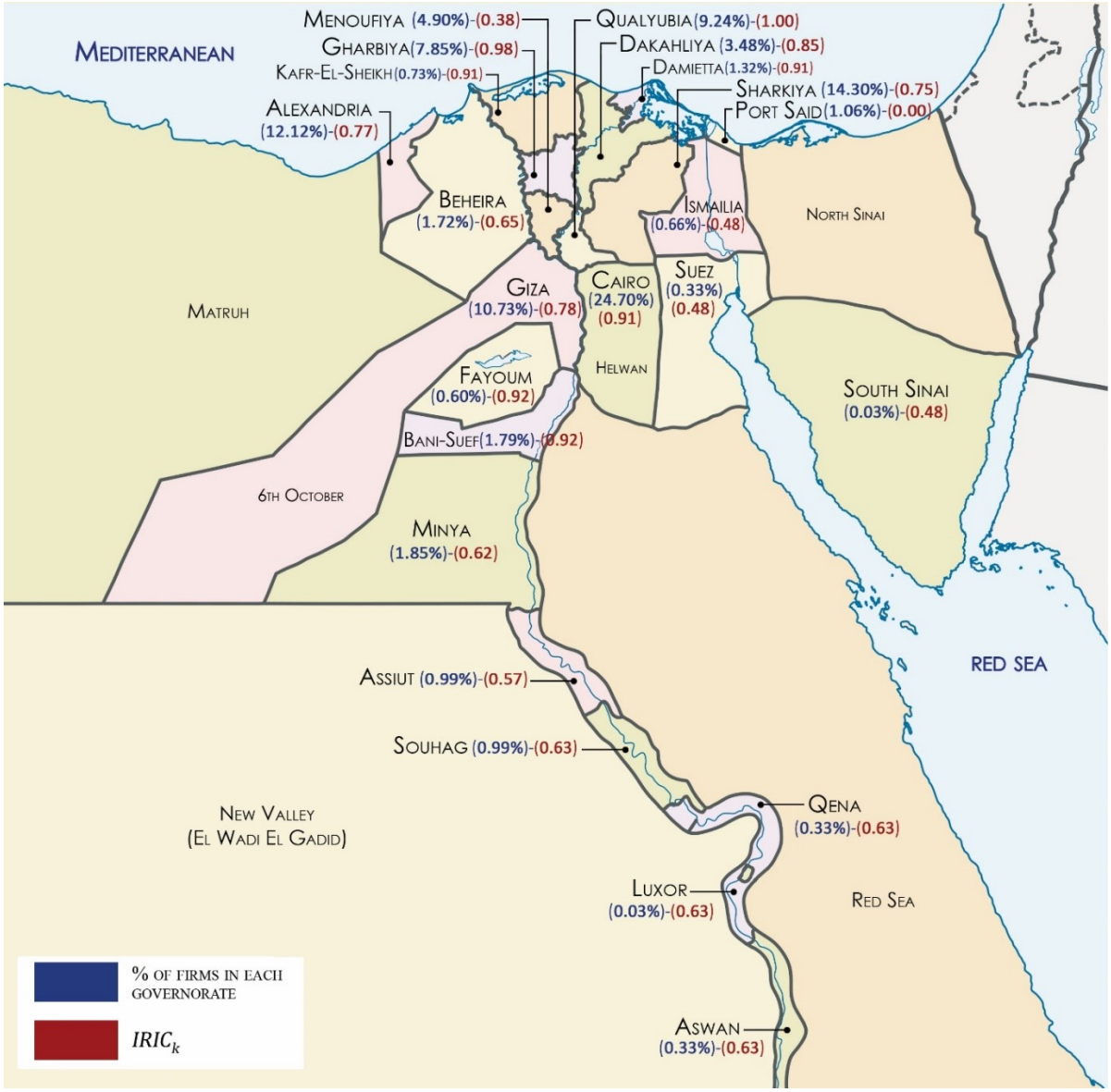
Table 2.1. Regions and governorates represented in the WBES

	Regions	Governorates		Freq.	Percent
1	**Greater Cairo**	**#**		**1349**	**44.67**
		1	Cairo	746	24.7
		2	Qualyubia	279	9.24
		3	Giza	324	10.73
2	**Alexandria**			**418**	**13.84**
		4	Alexandria	366	12.12
		5	Beheira	52	1.72
3	**Delta Region**			**552**	**18.28**
		6	Damietta	40	1.32
		6	Kafr-El-Sheikh	22	0.73
		7	Dakahliya	105	3.48
		8	Gharbiya	237	7.85
		9	Menoufiya	148	4.9
4	**Northern & South upper Egypt**			**206**	**6.82**
		10	Bani-Suef	54	1.79
		10	Fayoum	18	0.6
		11	Minya	56	1.85
		12	Assiut	30	0.99
		13	Souhag	30	0.99
		13	Qena	10	0.33
		13	Aswan	7	0.23
		13	Loxur	1	0.03
5	**Suez Canal & Sinai**			**495**	**16.39**
		14	Port Said	32	1.06
		15	Suez	10	0.33
		15	Ismailia	20	0.66
		15	South Sinai	1	0.03

		16	Sharkiya	432	14.30
			Total	**3,129**	

Source: authors' calculation based on the Egyptian manufacturing World Bank Enterprise Surveys (2004-2007-2008). Repeated numbers (#) in bold refer to grouped governorates.

Figure 2.1. Percentage of firms and $IRIC_k$ value per governorate in Egypt



Source: authors' calculation based on the Egyptian manufacturing World Bank Enterprise Surveys (2004-2007-2008).

Appendix 3

Table 3.1. List of variables included in our regressions

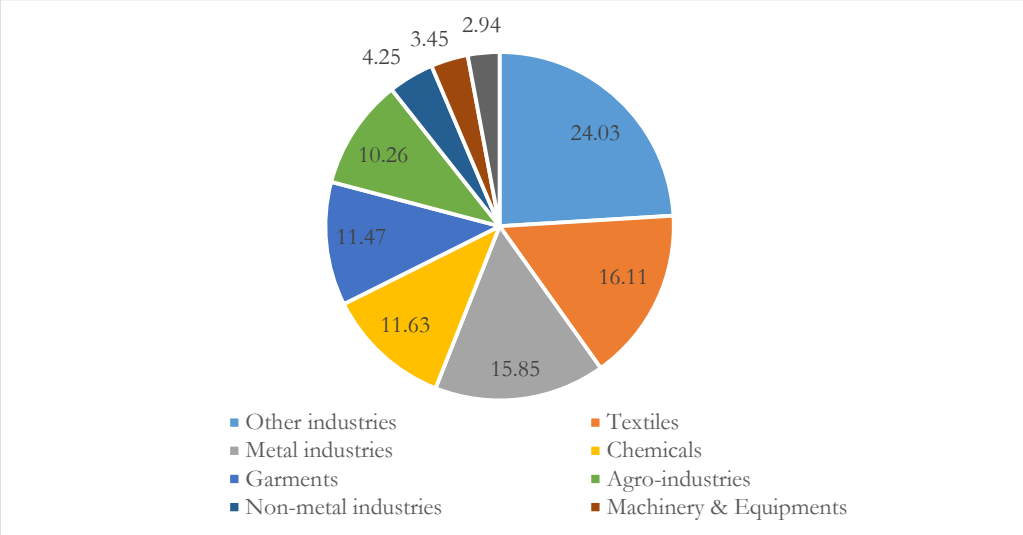
Variable	Definition	Obs.	Mean	Std. Dev.	Min	Max
$IRIC_k$	Regional indicator of informal competition intensity	3020	0.8103	0.1684	0	1
AGE_i	Firm age (years) =the difference between the interview's date and the date on which the firm began operation (plus one)	3017	23.59	17.238	1	149

EXP_i	Percentage of direct and indirect exports in firm's total annual sales	3015	10.299	23.99	0	100
CAP_i	Firm's percentage average capacity utilization over the year	3014	66.661	22.752	0	100
$UNION_i$	Percentage of unionized workers (in Workers' General Union)	2963	9.723	25.868	0	100
$Voter\_Turnout_k$	Percentage of voter turnout in the 2012 Egyptian presidential elections	3020	51.2	5.19	28.6	60.1
$TRAIN_i$	Dummy variable =1 if the firm's workers received internal or external trainings; 0 otherwise	3015	0.184	0.387	0	1
IND_i	Dummy variable =1 if the firm is located in an industrial zone; 0 otherwise	3016	0.343	0.474	0	1
INS_i	Dummy variable =1 if the firm has property and casualty insurance on its assets; 0 otherwise	3008	0.58	0.493	0	1
$FACT_i$	Dummy variable =1 if the firm has other factories and branches; 0 otherwise	3020	0.221	0.415	0	1
FI_CERT_i	Dummy variable =1 if firm's annual financial statement is checked and certified; 0 otherwise	3011	0.805	0.395	0	1
TEC_i	Dummy variable =1 if the firm uses a foreign technology or/and has R&D department or/and received an internationally recognized quality certification (e.g. ISO 9001, 9002 or 14 000, or sectors specific certifications such as HACCP for food, AATCC for textiles, etc.); 0 otherwise	2818	0.296	0.456	0	1
SAV_i	Dummy variable =1 if firm has a saving account, 0 otherwise	3007	0.22	0.414	0	1
TAX_i	Dummy variable =1 if the firm perceives tax rates as moderate, major or very severe obstacle; 0 otherwise (minor or no obstacle)	2948	0.688	0.463	0	1
COR_i	Dummy variable =1 if the firm perceives corruption as moderate, major or very severe obstacle; 0 otherwise (minor or no obstacle)	2981	0.686	0.463	0	1
$SKILLS_i$	Dummy variable =1 if the firm perceives finding adequate skilled and educated workers as moderate, major or very severe obstacle; 0 otherwise (minor or no obstacle)	3008	0.523	0.499	0	1
$Capital\_city_i$	Dummy variable =1 if the firm is located in Cairo (capital); 0 otherwise	3020	0.247	0.431	0	1
$Perceive_i$	Formal firms' perception towards illegal competition from informal sector =0 (no obstacle)=26.8% =1 (minor obstacle)=5% =2 (moderate obstacle)=9.4% =3 (major obstacle)=12.7% =4 (very severe obstacle)=46.1%					
$SIZE_i$	Firms' size (reference= large firms) = 0 (small, 5-19 employees)=36.8% =1 (medium, 20-99 employees)=29.8% =2 (large, +100 employees)=33.4%					
$SHARE_i$	Firms' ownership type (reference= private domestic)					

	= 0 (private domestic shares)=90.4% =1 (private Arab shares)=2.4% =2 (private foreign shares)=2.7% =3 (government shares)=3.8% =4 (other shares)=0.7%
EDU_i	Firms' top manager's level of education =0 (primary education)=5.8% =1 (did not complete secondary education)=3.8% =2 (secondary education)=7.5% =3 (vocational education)=5.4% =4 (some university degree)=66.8% =5 (post graduate degree)=7.4% =6 (PHD degree)=3.3%
WK_i	Source of firms' working capital (reference= internal earnings) =0 (more than 20% is financed by internal earnings)=84.1% =1 (more than 20% is financed by banks)=9.1% =2 (more than 20% is financed by family & friends)=6.8%

Source: authors' calculation based on the Egyptian manufacturing World Bank Enterprise Surveys (2004-2007-2008).

Figure 3.1. Formal firms' industries



Source: authors' calculation based on the Egyptian manufacturing World Bank Enterprise Surveys (2004-2007-2008).

Appendix 4

Table 4.1. Panel distribution

Panel - Firm interviewed	Freq.	Percent
Only in 2008	358	11.85
Only in 2007	78	2.58
Only in 2004	269	9.91
Only in 2004 and 2007	277	9,17
Only in 2007 and 2008	433	14.34
Only in 2004 and 2008	4	0.13
Only in 2004, 2007, 2008	1601	53.01
Total	**3020**	**100**

Source: authors' calculation based on the Egyptian manufacturing World Bank Enterprise Surveys (2004-2007-2008).

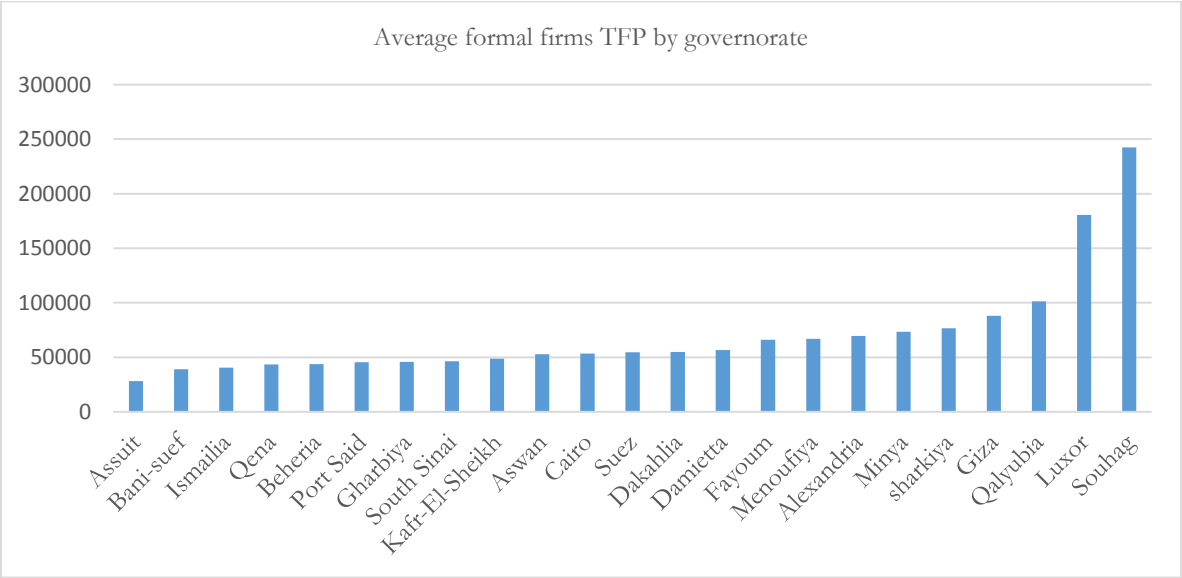
Appendix 5

Table 5.1. Productivity measures

Variable	Obs.	Mean	Std. Dev.	Min	Max
$PROD1_i$ Value added to total full time permanent workers	3020	140089.2	2945392	.0003	1.61e+08
$PROD2_i$ Value added to total annual workers (fulltime permanent+ weighted part-time permanent + temporary workers)	3020	75303.2	120743.3	.0002	986644
TFP_i	2916	68066.25	193505.5	.0023	5269224
$Total$ annual $fulltime\ permanent\ workers_i$	3020	255.9421	909.1277	.01	20000
$Total$ annual $workers_i$ (fulltime permanent+ weighted part-time permanent + temporary workers)	3020	515.0158	7536.284	2.01	375200

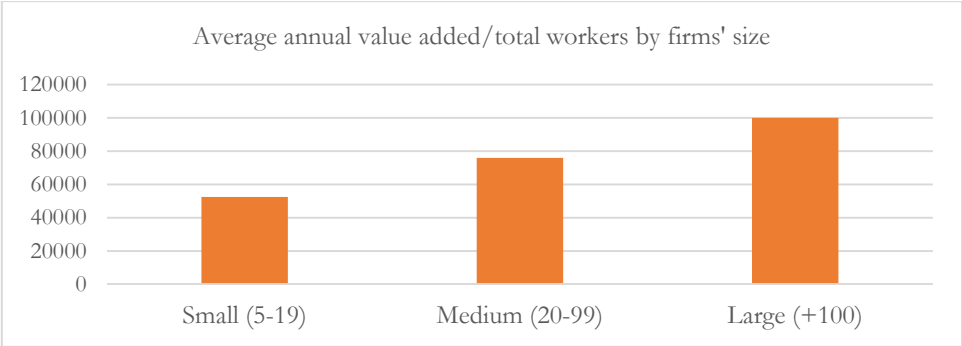
Source: authors' calculation based on the Egyptian manufacturing World Bank Enterprise Surveys (2004-2007-2008).

Figure 5.1. Governorates and formal firms' TFP



Source: authors' calculation based on the Egyptian manufacturing World Bank Enterprise Surveys (2004-2007-2008).

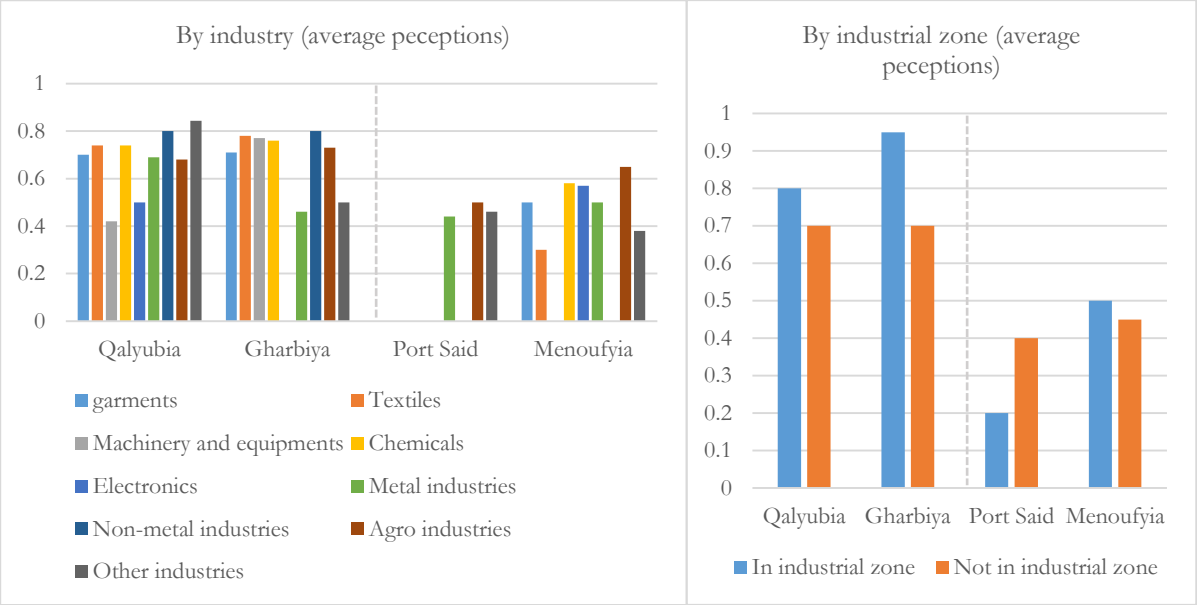
Figure 5.2. Formal firms' size and labour productivity



Source: authors' calculation based on the Egyptian manufacturing World Bank Enterprise Surveys (2004-2007-2008).

Appendix 6

Figure 6.1. Other aggregate levels of formal firms' perceptions towards informal competition



Source: author calculation based on the Egyptian manufacturing World Bank Enterprise Survey (2004-2007-2008).

Appendix 7

Table 7.1. Regional informal competition and formal firms' productivity - Robustness check

	(1)	(2)	(3)	(4)	(5)	(6)
av_IC_k	1.609***	0.781**				
	(0.370)	(0.361)				
$IRIC_k$			0.396**	0.396**	0.403**	0.403***
			(0.160)	(0.193)	(0.183)	(0.138)
$SIZE\_small_i$ (ref. large firms)	0.215***	-0.227***	-0.222***	-0.222**	-0.252**	-0.252***
	(0.0813)	(0.0740)	(0.0740)	(0.0922)	(0.101)	(0.0746)
$SIZE\_medium_i$ (ref. large firms)	0.136*	-0.231***	-0.230***	-0.230***	-0.243***	-0.243***
	(0.0762)	(0.0687)	(0.0702)	(0.0789)	(0.0780)	(0.0704)
AGE_i	-0.00284*	-0.00108	-0.00108	-0.00108	-0.000898	-0.00089
	(0.00151)	(0.00139)	(0.00143)	(0.00145)	(0.00150)	(0.00146)
INS_i	0.218***	0.133***	0.135***	0.135***	0.138***	0.138***
	(0.0482)	(0.0466)	(0.0498)	(0.0394)	(0.0387)	(0.0468)
EDU_i	0.0555***	0.0303*	0.0304*	0.0304	0.0383*	0.0383**
	(0.0192)	(0.0178)	(0.0173)	(0.0231)	(0.0227)	(0.0168)
$TRAIN_i$	0.0777	0.0981	0.0971	0.0971	0.115	0.115
	(0.0783)	(0.0768)	(0.0766)	(0.109)	(0.111)	(0.0765)
FI_CERT_i	0.0792	-0.0550	-0.0599	-0.0599	-0.0714	-0.0714
	(0.0575)	(0.0527)	(0.0494)	(0.0551)	(0.0573)	(0.0509)
$FACT_i$	0.105	0.152**	0.152**	0.152	0.167*	0.167***
	(0.0692)	(0.0622)	(0.0623)	(0.0964)	(0.0999)	(0.0648)
IND_i	0.379***	0.242***	0.238***	0.238***	0.252***	0.252***
	(0.0590)	(0.0565)	(0.0599)	(0.0566)	(0.0661)	(0.0542)
$SHARE_i$ (ref. private domestic)						
$SHARE\_arab_i$	0.493***	0.460***	0.462***	0.462***	0.475***	0.475***
	(0.127)	(0.132)	(0.128)	(0.157)	(0.158)	(0.135)
$SHARE\_foreign_i$	0.377**	0.223	0.229	0.229	0.290	0.290*
	(0.173)	(0.167)	(0.168)	(0.206)	(0.212)	(0.170)
$SHARE\_gov_i$	-0.283	-0.00334	0.000509	0.000509	0.00365	0.00365
	(0.249)	(0.255)	(0.262)	(0.253)	(0.265)	(0.255)

$SHARE\_other_i$	0.0775	-0.209	-0.204	-0.204	-0.144	-0.144
	(0.235)	(0.308)	(0.305)	(0.300)	(0.330)	(0.330)
EXP_i	0.00103	0.00157	0.00157	0.00157*	0.000773	0.000773
	(0.00128)	(0.00115)	(0.00120)	(0.000886)	(0.000880)	(0.00120)
Constant	8.773***	9.863***	10.07***	10.07***	9.795***	9.795***
	(0.300)	(0.279)	(0.186)	(0.294)	(0.228)	(0.159)
Observations	2,988	2,886	2,886	2,886	2,886	2,886
R-squared	0.098	0.089	0.089	0.089	0.074	0.074
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Panel ID dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	No	No
Region dummies	Yes	Yes	Yes	Yes	No	No
Level of se cluster			--	Region-industry	Region-industry	--

Notes: in column (1), the dependent variable $\ln(PROD2_i)$ is the logarithm of formal firm's labour productivity. In columns (2-6) the dependent variable is the logarithm of formal firm's TFP. All monetary values are in Egyptian pounds. av_IC_k is the average of the perception variable ($PERCEIVE_i$) across governorates (k). $IRIC_k$ is the indicator of informal competition intensity measured at the governorate-level (k). List of variables is provided in table 3.1 (appendix 3). We control for firm's interview year, the number of times it has been interviewed, industry, and regional location. Non-parametric robust bootstrapped standard errors (1000 replications) are reported in brackets in all the columns and are clustered by region-industry in columns (4 & 5). *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

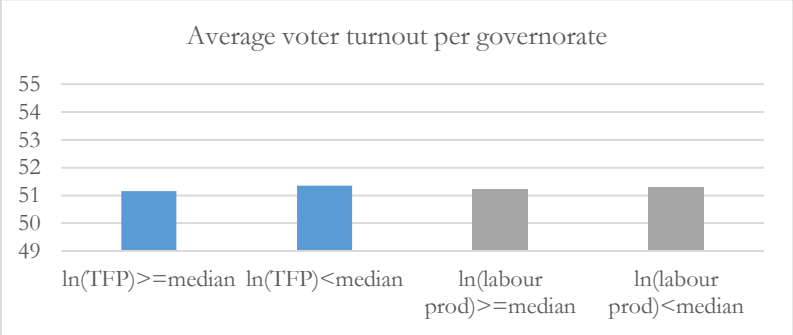
Appendix 8 The statistical exogeneity of the instrument (Voter turnout)

Table 8.1. Correlation matrix

	$Voter\ Turnout_k$	$IRIC_k$	$\ln(PROD2_i)$	$lTFP_i$
$Voter\ Turnout_k$	1			
$IRIC_k$	0.1560***	1		
$\ln(PROD2_i)$	-0.0203	0.0379**	1	
$lTFP_i$	0.0038	0.0275	0.8879***	1

Notes: $Voter\ Turnout_k$ is the voter turnout of the 2012 presidential elections measured at the governorate level (k) and is used as an instrument for $IRIC_k$. $IRIC_k$ is the regional indicator of informal competition measured at the governorate level (k). $ln(PROD2_i)$ is the logarithm of formal firms' labour productivity. $lTFP_i$ is the logarithm of formal firms' TFP. All monetary values are in Egyptian pounds. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

Figure 8.1. Voter turnout and formal firms' productivity



Source: authors' calculation based on the Egyptian manufacturing World Bank Enterprise Surveys (2004-2007-2008).

Appendix 9

Table 9.1. Governorate-year indicator construction ($IRIC\_yr_{k,t}$) - First step estimation

	Probit estimation
$Total$ annual $fulltime\ permanent\ workers_i$	-0.0000243
	(0.0000)
AGE_i	0.000551
	(0.00)
	0.114**

$SKILLS_i$	(0.06)
TAX_i	0.236***
	(0.06)
COR_i	0.336***
	(0.07)
CAP_i	-0.00678***
	(0.00)
EDU_i	0.0174
	(0.03)
$UNION_i$	-0.00169**
	(0.00)
$TRAIN_i$	-0.0455
	(0.08)
Constant	-5.169***
	(0.25)
Observations	2,864
pseudo R2	0.0942
GOV_YEAR_{kt} (ref. Port-Said-2008)	YES
Panel ID dummy	YES
Year dummy	YES
Level of se cluster	Region-industry

Notes: the dependent variable $PERCEIVE_i$ is a dummy variable taking the value of one if formal firms perceive the practices of competitors in the informal sector as a binding constraint and zero otherwise. List of variables is provided in table 3.1 (appendix 3). GOV_YEAR_{kt} are a set of dummies for each couple of governorate-year included in the sample. The reference governorate-year is Port-Said-2008. Dummies for interview year and panel ID (number of times the firm is interviewed) are included. Robust standard errors are clustered by region-industry and reported in brackets. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

Table 9.2. Governorate-year level indicator of informal competition

Governorate-year (total 44 groups)	Regional dummy Coefficient	Normalized measure of $IRIC\_yr_{k,t}$
Top 5 lowest governorate-year in informal competition		
Port Said-2008	0	0
Ismailia, Suez & South Sinai-2007	4.340***	0.647278151
Minya-2004	4.536***	0.676510067
Minya-2007	4.590***	0.684563758
Menoufiya-2008	4.652***	0.693810589
Top 5 highest governorate-year in informal competition		
Dakahliya-2008	5.806***	0.865920955
Ismailia, Suez & South Sinai-2008	5.898***	0.879642058
Sharkiya-2007	5.915***	0.882177479
Qualyubia-2008	5.993***	0.893810589
Minya-2008	6.705***	1
Classification of the average of governorate-year informal competition by governorate		
Port Said		0.48143177
Menoufiya		0.73616704
South upper Egypt (Souhag, Qena, Aswan & Luxor)		0.76480239
Ismailia, Suez & South Sinai		0.77007209
Assiut		0.7753915
Minya		0.78702461
Beheira		0.78762118
Giza		0.80233656
Bani-Suef & Fayoum		0.80328113
Alexandria		0.80382799
Sharkiya		0.80750684
Dakahliya		0.82276908
Cairo		0.82450907
Damietta & Kafr-El-Sheikh		0.82614964
Gharbiya		0.8383296
Qualyubia		0.84185931

Notes: The governorate-year' dummy coefficients are obtained from a probit estimation of the equation (10) using Egyptian manufacturing WBES in 2004, 2007 and 2008. The $IRIC\_yr_{k,t}$ is the normalized measure of regional informal competition intensity computed as in equation (11). *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

Appendix 10 The effect of the 2005 new tax law (Ministry of Finance, 2007; Ramalho, 2007; African Development Bank, 2009)

- The reduction of the tariff on basic and essential goods from 14.6% to 8.9%
- The reduction of withholding tax on interest and royalties from 32% to 20% flat rate
- The reduction of the highest personal tax rate from 32% to 20%
- The reduction of the personal income tax by including three tax rates of 10, 15 and 20% maximum
- The introduction of an annual tax exemption of EGP 4000 ($ 700) for all individual tax payers
- Tax equalisation for all company by paying a 20% tax on profit (instead of 32% or 40% depending on the activity)
- Compatibility of the income tax to international practices
- Provision of trainings to tax officers to improve the collection of taxes
- The enhancement of tax administration procedures by replacing administrative assessment by self-assessment techniques
- The simplification of procedures and the promotion of trust between the business community and the tax administration
- The introduction of a grace period that exempts non-registered tax payers from old taxes due if they registered and pay tax under the new law
- Open tax forgiveness to companies leaving the informal economy and becoming registered
- The introduction of computerized records for companies to submit their demands
- The exemption of tax on profits from land reclamation or cultivation establishments for a period of 10 years
- The exemption of certain industrial and commercial activities (including hotels and tourist projects, reclamation of desert lands, etc.) for a period of 5 years
- The exemption of new industrial zones and new urban communities as well as remote areas and new projects financed by the Social Fund for Development for a period of 10 years
- The exemption of any establishment outside the Nile valley for a 20-years period
- Full 5- to 20-years tax exemptions for newly established companies, to be applied non-retroactively
- Higher penalties for tax evaders
- The prevention of double taxation with over 15 countries (including several EU member states such as Italy, France, Germany, Sweden among others), as well as the United States, India and Japan

Chapter (3)

Informal Competition and productivity in Sub-Saharan Africa

(With Boris NAJMAN*)

Abstract

Despite the recognised contribution of competition to spurring productivity growth, competition stemming from informal firms has always been considered as a threat to formal firms. This chapter investigates the significance of this default hypothesis. Using the World Bank's Enterprise Surveys for low-income Sub-Saharan African countries, we update the two-step methodology of Guiso et *al.* (2004) to build a local indicator of informal firms' competition. We show that more intense competition stemming from informal firms can drive formal firms to become more productive. Our finding remains robust to different specifications and to the implementation of an instrumental variable model that solves potential econometric biases and shows the simultaneous relationship that taxation and informal firms' competition have on formal firms' productivity. Yet, this positive effect is segmented by formal firms' size and sector of activity, and depends on the severity level of labour regulations. Our findings call on the importance of revisiting the informal sector' impacts in developing countries.

Keywords. Formal and informal firms, Informal competition, Firms' productivity, Taxation, Regulation, Firms' constraints, Sub-Saharan Africa.
JEL. O17, D22, L25.

* B. NAJMAN, Université Paris-Est, ERUDITE (EA 437), F-94010, Créteil, France, CASE. Email: najman@u-pec.fr

1. Introduction

The 2005 economic catch-up in Sub-Saharan Africa has opened up questions about the informal sector's role in recent GDP trends (La Porta and Shleifer, 2008). In Africa, productivity growth is coupled with a growing and persistent informal sector. We underline this controversy by investigating the informal sector's contribution to one of the main drivers of economic growth; "market competition". In other words, we test the effect of competition stemming from informal firms, hereafter referred to as "informal competition", on the productivity of formal firms by taking into consideration regional and firms' characteristics.[35]

Our motivation arises out of investigating the informal sector controversy; whereby, if the informal sector is considered as a threat to formal firms and regional economies, why is it growing considerably, not only in developing countries but also in developed ones? Why are the activities of the informal sector still ignored and discouraged by governments? Is it enough to say that the informal sector is expanding because it allows people to escape taxation, to avoid business regulation and thereby to gain a cost advantage over formal firms? In addition, what about the recent "unexplained" African economic growth, described as a "miracle" by Young (2012)? Is it appropriate to ascribe this entire economic catch-up by the "big push theory"? This puzzle encourages us and more recent papers to reconsider the informal sector's role in developing countries by looking at the entrepreneurial capacity that could arise from this sector.[36]

Launched in 1972 by the International Labour Organization (ILO) report, the concept of the "informal sector" was initially presented with a very positive and optimistic view (ILO, 1972; Bangasser, 2000). However, the reports' description of the informal sector's economic efficiency was not widely accepted by economic analysts at that time, and the most common interpretation of the informal sector was to characterise it as a temporary shelter for the poor that would disappear with increasing economic development. The standard view of the informal sector as a threat to economic activity became a self-fulfilling prophecy that has persisted over time.

Consequently, given this prevailing view, most of the studies into the informal sector have tended to emphasise its negative impacts on the overall economy (Singer, 1970; Lewis, 2004; Perry et *al.*,

---

[35] In our sense, informal firms are those firms who fail to comply with economic regulations (such as registering and licensing) and who fail to meet their tax obligations. They also refer to micro and self-employed firms (with less than five employees) (ILO, 2009).

[36] See for example the recent studies of Maloney, 2004; Webb et *al.*, 2009 & 2013; Williams at *al.*, 2016; Amor-s et *al.*, 2016; Ali & Najman, 2017.

2007; etc.). These studies commonly show that the informal sector is a drag on productivity. It comprises unproductive activities that lack access to formal sources of finance, to government services, to proper documentation and to infrastructure. They tend to employ unskilled and less productive workers and their output is more labour-intensive. These aspects imply that everything related to the informal sector is – by default – harmful to the formal economy, including the competition stemming from informal firms, which is the focus of the present chapter.

Although competition is well-known to be one of the key economic drivers of growth, papers in the literature considering informal competition have also treated it as harmful. For example, the papers of González and Lamanna (2007) and Friesen and Wacker (2013) focused exclusively on detecting the main characteristics of formal firms that allow them to avoid the negative impacts of informal competition. They ignored the fact that even informal competition can help in creating strong and efficient markets by keeping the most efficient producers and squeezing out inefficiencies and misallocation of resources. To the best of our knowledge, no study has so far tested the significance of this default assumption. This chapter aims to fill this gap, by empirically testing the real effect of informal competition.

We choose to focus on Sub-Saharan Africa, as most of this region comprises developing countries with low-income levels and very large informal sectors. The region has the highest proportion of informal activities in percentage of official GDP according to Schneider et *al.* (2010). More precisely, Charmes (2012)'s analysis on the employment in the informal sector in Sub-Saharan Africa indicated that the peak of informal employment has occurred between 1995 and 1999, with an informal sector accounting for 86.9% of non-agricultural employment. Then, between 2000 and 2005 the percentage dropped to its minimum level, with informal employment accounting for 63.3% of employment. However, the percentage has started to increase again and reached 69.5% between 2005 and 2010, especially in low income countries which are the focus of this chapter.

As highlighted in table 1.1 (appendix 1), the informal employment rate, in low-income African countries, is very large, and is beyond 70% in some countries, such as in Madagascar, Mali, Uganda and the Democratic Republic of Congo. Also, the percentage of the informal economy in official GDP accounts for more than 40% in most of the countries. Moreover, the informal sector's controversy is accentuated in these countries. Some countries report simultaneously high GDP growth and high rates of informal economy and informal employment (such as in Tanzania, Ethiopia, and Rwanda).

Hence, the situation in low-income Sub-Saharan African countries supports the underlying debate on the informal sector. That's why we use "informal competition" as a measure to reconsider the economic efficiency of this sector. Informal competition has been highlighted in the 2013 World Development Report (World Bank, 2013) and has been reported through the World Bank Enterprise Survey indicators. According to these last, it has been reported that in Sub-Saharan Africa, 66% of formal firms compete against informal firms and 39% of formal firms perceive the competition practices in the informal sector as a major or very severe constraint to their current operation. Moreover, informal competition has been ranked as the third most important obstacle to the development of formal firms. There is two reasons explaining the underlined bad perception towards informal competition. First, informal competition is generated by the growing number of informal firms, which is initially considered as a threat to formal firms and the wider economy. Second, it is perceived that informal firms have a cost advantage, due to not paying taxes, proper wages or following regulations, allowing them to undercut prices and therefore engaging in "unfair competition".

In contrast to the prevailing view on the informal sector, in this chapter we assume that informal firms could be inherently entrepreneurial through the positive outcomes that informal competition may arise on formal firms' productivity. We believe that informal firms' cost advantage induces formal firms to boost productivity by better allocating their resources. That's why, we start our empirical analysis by identifying the productivity gap between two groups of formal firms; "competing" firms (formal firms perceiving informal competition as a binding constraint) and "non-competing" firms (formal firms not perceiving informal competition as a binding constraint). Therefore, we adopt an endogenous switching regression model that shows, from one hand, that there is a significant productivity gap between the two groups of firms. And confirms, from the other hand, that the productivity of "competing" firms is higher than "non-competing" firms.

Our empirical analysis is based on a pooled sample of 10718 formal private firms extracted from the standardised World Bank Enterprise Surveys (WBES), over the period 2006-2013 in 23 low-income Sub-Saharan African countries.[37] As presented in table 1.1 (appendix 1), these countries have a homogenous economic development pattern in terms of the prevalence of poverty, informality, governance, and institutional quality, which allows us to carry out a pertinent cross-country analysis. Moreover, as we assume that informal competition's effects are better felt locally than nationally or internationally, this dataset allows us to implement a regional analysis thanks to

[37] See appendix (2) for the full list of regions, countries and cities included in our analysis.

the availability of city-level data for each country. Surveyed firms are located across three different African regions (Central, East and West Africa), in 23 different countries and 78 different cities.

Therefore, we start our estimation of the effect of informal competition on formal firms' productivity by constructing a city-level indicator of informal competition using the Guiso et *al.* (2004) methodology. This indicator is our dependent variable of interest that provides a measure of the intensity of informal competition in each of the 78 cities included in our sample. Our estimation reports a positive and significant effect of informal competition on formal firms' productivity (measured by labour productivity or total factor productivity). Furthermore, in order to identify the channel through which this reported positive effect occurs, we involve in our estimations some non-linear effects. Our results show that the positive effect that informal competition has on formal firms' productivity is segmented by formal firms' size and sector of activity, and depends on the severity level of labour regulations.

However, our specification reveals two econometrics issues. First, informal competition may have a direct effect on the productivity of formal firms and vice versa (reverse causality bias). Second, an omitted variable bias can affect our specifications due to unobservable firm-level characteristics. That's why we test the validity of our initial results by adopting an instrumental variable approach that helps eliminating the underlined biases. We follow Fisman & Svensson (2007) methodology by testing the relationship between informal firms' competition, taxation and formal firms' productivity using group averages by location and industries as instruments. Our findings remain robust to the initial estimation's results. We also provide evidence suggesting that the direct effect of taxation on formal firms' productivity implies an indirect effect of informal firms' competition on formal firms' productivity. The higher is the taxation rate, the bigger is the cost differential between formal and informal firms, and the stronger is informal firms' capacity to compete and take market shares. By consequence, formal firms are motivated to boost productivity by adopting more efficient internal organisation and resource allocation techniques, enabling them to regain market shares.

This chapter is laid out as follows. In section (2), we present a review of relevant literature and our hypotheses. In section (3) we present the dataset used in this chapter and the main summary statistics. We also present our productivity measure and construct the regional indicator of informal competition. In section (4), we explain the methodology used and we discuss reported results. Finally, the last section summarises our conclusion and remarks.

2. Literature review and hypotheses

2.1 Relationship between formal firms, informal firms and economic development

In the past, studies on the informal sector focused mainly on questioning the nature of this sector and its implication on the society and the economy as a whole. That's why many school of thoughts tried to understand the interaction between the formal and informal sectors to answer these questions. According to the Dualist School (Hart, 1973; ILO, 1972), the informal and formal sectors coexist but are very different by nature. While Formal firms contribute to economic growth, informal firms act as a shelter for poor. Some expected that informal firms disappear with economic development and the surplus of labour is absorbed by the more productive formal sector in the long term (Lewis, 1954; Harris & Todaro, 1970). Others expected a more persistent and dangerous dual market because of engendered market imbalances (Singer, 1970). However, the Structuralist School (Moser, 1978; Castells & Portes, 1989) suggested that the informal sector is linked by nature to the formal sector because informal firms are subordinated to formal and larger firms and allow these last to reduce costs and increase competitiveness.

Starting from the 90's, growing informality trends all over the world moved the debate forward to understand the persistence of informality and the motivation behind joining the informal sector. From here, appeared the legalistic approach, constructed by De Soto (1990) who studied the informal sector in Peru in an original way that recognizes the contribution of this sector in the economy. He explained that firms choose voluntarily to be informal to avoid the burden of taxes and regulations. Yet, informal firms should not be considered as a threat to the economy because they have the willingness to formalize if the government provides them property rights and alleviates registration procedures. In contrast, the Voluntarist approach, created by Lewis (2004), considered informal firms as a threat and denied their willingness to formalize. He also claimed that informal firms cause unfair competition and are able to take inefficiently market shares from more productive formal firms.

More recent studies tended to adopt micro-perspectives rather than macro ones, to present more detailed answers and solutions for policy makers. Maloney (2004) equated the urban informal sector in developing countries, more particularly in Latin America, to the entrepreneurial small firms sector in developed countries. Bigsten et *al.* (2004) found no significant productivity gap between small formal firms and their informal counterparts in Kenya, whilst formal firms have more investment and exporting opportunities. La Porta & Shleifer (2008) failed to find a clear conclusion on the contribution of the unofficial economy in economic development based on a

sample of formal and informal enterprises in African, Asian, and Latin American countries. They rather pointed out that productivity growth comes from formal larger firms, because as the economy grows, informal firms rather die than register (as emphasized by the Dualistic school). Sparks & Barnett (2010) argued that the underlined debate must end when addressing the Sub-Saharan African case. They advocated that the state needs to recognize the importance of the informal sector, to help this sector to integrate the economy in an effective way and to foster the growth of the formal sector.

However, determining whether the informal sector is a driver of economic growth or an opponent to productivity is still a critical ongoing debate (Jütting, 2009). This chapter adds to this debate by looking at the relationship between the formal and informal sectors under a different angle that accounts for informal firms' competition. This angle is under-researched in the literature because informal competition has always been considered as a threat. Some designate it as "unfair competition" because it results from firms that circumvent taxes and regulations (Perry et *al.*, 2007; OECD, 2009). Others try to identify the characteristics of formal firms that make them more subject to the practices of competitors in the informal sector. For example, the results of González and Lamanna (2007)'s paper show that formal firms most resembling informal ones are the most adversely affected by informal competition in Latin America. These formal firms are usually small, credit constrained, operate in industries with low entry costs, and serve the same type of consumers as informal firms. Also, the paper of Friesen and Wacker (2013) add that more financially constrained formal firms, in developing and transition countries, are more subject to the practices of competitors in the informal sector.

Hence, by looking at the effect of informal firms' competition on formal firms' productivity using a micro-analysis on multiple low income countries in Sub-Saharan Africa, this present chapter tries to test the validity of the underlined default assumption in order to draw conclusions for the following hypothesis;

Hypothesis 1 *The relationship between formal and informal firms - through competition - could be an engine for growth, explaining the strong persistence of the informal sector and its growing expansion around the world.*

2.2 Entrepreneurial capacity of the informal sector

Our first hypothesis is also derived from the fact that recent studies in management and entrepreneurship research open up the debate about the entrepreneurial capacity of the informal sector. These studies try to look beyond the widespread negative view of the informal sector, by exploring its potential positive outcomes that may explain its endurance. For example, Webb et *al.*

(2009 & 2013) used a mixture of institutional, motivation-related and resource allocation theories to propose an extensive list of factors that recognize informal sector's opportunities. Three important factors were listed (among others); institutional distrust and imperfection, burdensome cost and procedures, and resource-constrained business environment. According to these factors, the entrepreneurial capacity of the informal sector is more prominent in developing countries. As explained by Godfrey (2015), the failure of formal sector's benefits and the imbalances between informal and formal institutions set the informal sector as the "first best" alternative. Also, as argued by Amor-s et *al.* (2016), a certain amount of informality is necessary as a practical substitute for the formal sector in countries with weak institutions. According to this last study, it has been reported that the informal sector has a positive effect on economic development measured by the Human Development Index.

The informal sector also allows for a better allocation of economic resources by exploiting idled ones. Williams et *al.* (2016) showed that a better allocation of resource, by engaging in late registration, could be beneficial for the firm. Using a Heckman 2-step model with firm-level WBES dataset on 127 developing countries, they found that the performance of formal firms that start up unregistered and spent more years operating informally is stronger than firms allocating all their resources to register from the outset. Moreover, many studies (such as Chen, 2012; Williams, 2014) highlighted the importance of linkages from which both formal and informal firms can benefit. As the informal sector provides the market with cheaper goods, services and materials, formal firms engage in effective backward and forward linkages through subcontracting and outsourcing practices with the informal sector. These practices are very common in Sub-Saharan African countries, but are sometimes very weak (Grimm & Günther, 2005; Böhme & Thiele, 2012).

More particularly, Ali & Najman (2017) argued that informal competition allows for a better mobilization of unused or underused resources. Using a sample of Egyptian manufacturing firms, they empirically prove that informal competition has a positive and significant effect on the productivity of formal firms. They explain that formal firms more subject to informal competition are more prompt to boost their productivity in order to overcome informal firms' cost advantage. They also provide evidence that the amount of taxation, that determines the differential in cost between formal and informal firms, is the main channel through which this positive effect could occur.

In this chapter, we propose to follow the same idea as in Ali & Najman (2017) in order to test the relationship between formal and informal firms, and to explain the strong persistence of the

informal sector in low-income Sub-Saharan countries. This proposition is also derived from our attempt to find the true net effect of informal firms' competition. As already mentioned, informal competition has always been considered as a threat in the literature, although many studies proved theoretically and empirically the importance of "normal" market competition in creating a healthy economy (Nickell et *al.* 1997; OECD, 2009; Schiffbauer & Ospina, 2010).

As emphasized by Williams & Martinez-Perez (2014), we claim that informal firms are strong competitors because they are able to provide goods and services with lower prices, good quality and rapid. As informal firms are small and usually managed by a single person, they have more simple communication strategies and more flexible production processes comparing to formal ones. They are able to quickly move where there is a demand and to serve the market with new and less expensive products and services. They are also able to adapt more easily their labour organisation and internal management to handle different market shocks (Saviotti and Pyka, 2008; Gülbiten and Taymaz, 2000; Duchêne and Rusin, 2002). Hence, informal firms' competition is mainly based on their creativity in terms of adopting new managerial practices.

As the informal sector outweighs the formal sector in most of Sub-Saharan African countries, we believe that the incidence of informal competition is very deep, and hence, is subject to testing by evaluating the following hypothesis;

Hypothesis 2 *Through competition, informal firms can generate positive outcomes to the economy, proving their entrepreneurial capacity.*

2.3 Transmission channels

Disregarding the direction of the effect that informal competition have on formal firms' productivity, there must be a cut-off point that determines the endurance of this effect. This cut-off point can be identified through different factors that account for the characteristics of the firm (size, sector of activity, etc.) and for the business environment in which it operates and grows (taxation, regulation, infrastructure, access to finance, etc.).

The relationship between formal firms' size, sector of activity and informal firms' competition has been highlighted by González and Lamanna (2007) who showed that small formal firms, operating in sectors with low entry costs are more subject to direct competition from informal firms. This is related to the fact that informal firms prefer to remain small to circumvent regulation. Hence, they are more susceptible to operate in sectors with low entry costs (*i.e.* service sector activities). Similarly, La Porta and Shleifer (2014) concluded that even small formal firms are more productive

comparing to small informal ones. Whilst, others concluded that informal firms are strong competitors because of their small size that allows them to have more flexible internal organization techniques (Ali & Najman, 2017; Saviotti and Pyka, 2008; etc). Putting things together, we can say that informal competition would report a positive effect on small formal firms' productivity if these last have the enough capacity to boost their productivity (by adopting more efficient internal organisation techniques and by better allocating resources). However, it would have a negative effect if informal firms are very strong competitors and are able to efficiently take market shares from formal ones. Regarding medium and larger formal firms, we assume that their capacity to create economy of scales enable them to easily fight informal firms' competition.

Furthermore, formal firms are subject to many costs that determine the strength of competition. These costs include; tax rates, labour regulations' costs, registration' costs, licensing' costs and others. If these costs are low, the differential in costs between formal and informal firms is limited and formal firms are more capable to fight informal firms' competition by boosting productivity (and vice versa). According to Ali & Najman (2017), firms located in areas with moderate to high intensity of informal firms' competition report higher productivity levels than their counterparts when tax rates are reduced. Yet, Sub-Saharan Africa remains a very difficult place to do business with an average ranking of Doing Business of 143 over 189 (International Bank for Reconstruction and Development & World Bank, 2017; ILO, 2009). Formal firms' constraints related to tax rates, tax administration procedures, licensing and registration are still very challenging. By consequence, informal firms in Sub-Saharan Africa have an important advantage in cost that allows them to take market shares from formal firms (Schneider & Enste, 2000). This, in turn, encourages more individuals to join the informal sector which weighs on the tax base and the government's capacity to provide services.

The growth of the informal sector is also a sign of popular resistance arising because of the dysfunctional social contract between the state and its citizens (Jütting (2009), Maloney, 2004). The underlined dysfunctionality is directly linked to institution imperfection and the government incapacity to provide a sound business environment that ensures effective regulation and business law, the fluidity of the financial system and the availability of sound infrastructure. Such an environment helps the competition process to generate its expected positive effects. However, these conditions do not hold in most of Sub-Saharan African countries. The "Ease of Doing Business" index and the "Regulatory Quality" estimates reported in table 1.1 (appendix 1) show to what extent the business environment is challenging in low-income African countries. Also, as reported by the Doing business report (World Bank, 2015) and the CPIA Africa report (CPIA

Africa, 2015), Sub-Saharan countries typically suffer from weak regulatory frameworks and poor law enforcement. In addition, the corruption is very persistence, the provision of infrastructure is very poor, and the access to external sources of finance remains very challenging. Considering the importance of these issues in determining firms productivity (Eifert et *al.*, 2005) and Ayagari et *al.*, 2008), this chapter tries to test the following hypothesis;

Hypothesis 3 *The effect that informal competition has on formal firms' productivity depends on other factors that account for formal firms' characteristics and the quality of the business environment.*

3. Data and stylised facts

This chapter is based on the firm-level WBES that have been conducted by the World Bank and its partners in many developing and transition countries since 2002.[38] 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 the manufacturing and service 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 generated an appropriate sample size to benchmark the business environment of each economy from the perspective of the firm, using face-to-face interviews with the owner or the manager of the firm.

In this chapter, we use the standardised WBES, which employs a uniform sampling methodology to minimise measurement errors and provide data that are comparable across the world's economies. As the institutions and government systems are very heterogeneous across countries, we choose to focus our analysis on the group of low-income countries of Sub-Saharan Africa. Our pooled sample accounts for 10718 formal private firms, surveyed during the period 2006 to 2013.[39] As shown in appendix (2), these firms are from 23 low-income Sub-Saharan African countries located across three different African regions. 57.2% of surveyed firms are located in East African countries, 28.6% are located in West African countries and 14.3% are located in Central African countries. Also. Surveyed firms in each country are from different cities. There is a total of 78 cities (3 cities on average per country). These firms are equally divided between the manufacturing and

[38] The data are available and downloadable through the World Bank portal - http://www.enterprisesurveys.org

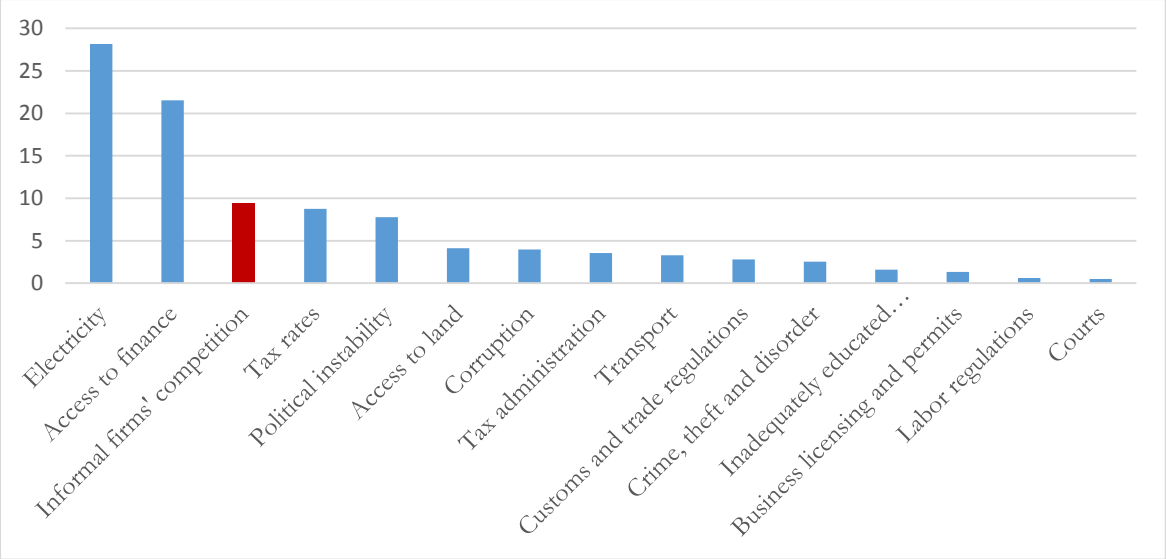
[39] Surveys are conducted in each country at different points in time; 2006, 2007, 2009, 2010, 2011 and 2013. Surveyed firms are not followed across the years, explaining why we implement a pooled analysis rather than a panel analysis.

the service sectors and operate in 15 different industries such as retail and wholesale (26%), Food (12%), Hotel & restaurants (8%) and garments (7%) (see figure 3.1, appendix 3).

As reported in table 3.1 (appendix 3), the majority of surveyed firms are small or medium-sized firms (63.5% and 26.2% respectively vs. 10.2% are large), and 59.4% of firms operate as a sole proprietorship. This mirrors the fact that the business environment in Africa is mainly composed of small and medium enterprises and displays fast growth of self-employment. Besides, the average firms' age is 15 years and the average managers' years of experience is around 13 years. According to our data, older firms are bigger and are usually run by more experienced managers, but are less productive comparing to younger and smaller firms.

Regarding the business environment in which surveyed firms operate and grow, figure (1) below shows that formal firms' most serious obstacles are their access to electricity, followed by their access to source of finance, and the practices of competitors in the informal sector. This is due to the fact that 86% of firms consider access to infrastructure, in terms of electricity, land and transport, as a binding constraint. And, 83% of firms finance their working capital mostly on internal funds (internal earnings, remittance, inheritance, salaries, etc.), while only 6% of firms finance it on external funds (line of credit or loan from banks). By consequence, only 13% of firms are engaged in direct or indirect exportation that represents an average of 6% of their annual sales revenues, and only 16% have an internationally-recognized quality certification. Furthermore, more than half of the sample considers corruption, tax rates and tax administration procedures as obstacles to the daily operation of their firms, while almost 23% of firms perceive labour regulations as a binding constraint. These barriers to entry are among the primary reasons why firms choose to operate informally. That's why the informal sector became the norm in developing countries.

Figure 1. Formal firms' most serious business obstacles



Source: authors' computation based on the standardised World Bank Enterprise Surveys in low-income Sub-Saharan African countries (2006-2013).

Regarding the informal competition constraint, our data show that 56% of formal firms perceive the practices of competitors in the informal sector as a binding constraint. According to table 4.1 (appendix 4) and comparing with formal firms not perceiving informal competition as a binding constraint, "competing" firms are ultimately smaller and operate as a sole proprietorship. They are more subject to business environment's constraints in terms of access to electricity, severity of corruption practices, tax rates and labour regulations. Both groups of firms are slightly more concentrated in the service sector comparing to the manufacturing service. There is relatively more "competing" firms in industries like retail and wholesale, food, and hotel and restaurant, while there is relatively more "non-competing" firms in industries like auto and auto-components, and non-metallic and plastic materials. Regarding their location, there is relatively more "competing" firms in cities like Jinja (in Uganda), Cotonou (in Benin) and N'Djamena (in Chad), while there is relatively more "non-competing" firms in cities like Tigray (in Ethiopia), Butare (in Rwanda) and Banjul (in Gambia).

The underlined characteristics make the standardised WBES ideal for the purpose of this study. First, its methodology generates optimised data for the type of cross-country comparison employed in this chapter. Second, this survey provides unique information about the degree of informal competition, comparable across all regions and cities included in the sample. Therefore, it allows us to implement a local analysis by constructing a city-level indicator of the intensity of informal competition. Third, the standardised WBES covers not only medium and large enterprises, it also covers small enterprises, which is crucial for investigating the incidence of

informal competition on the productivity of formal firms. Fourth, it allows us to emphasize the indirect effects of important business environment characteristics.

As the purpose of this chapter is to estimate the effect of informal firms' competition on formal firms' productivity, the next sub-sections (3.1 and 3.2) present the variables used to measure our dependent variable (firms' productivity) and our independent variables of interest (local informal competition).

3.1 Measuring formal firms' productivity

There are many different measures of firms' productivity, each of them has its own strengths and weaknesses. The choice between them depends on the purpose of the productivity measurement, and in many cases, on the availability of data. In our case, we use a single factor productivity measure – firms-level labour productivity – since data on firms' capital costs, material costs and electricity costs are available only for a very limited number of firms in our sample. Therefore, we use total factor productivity measure (TFP) as a form of robustness check. [40]

According to equation (1) below, for each firm (i), the logarithm of formal firms' annual labour productivity is the ratio of the last fiscal year's total sales revenues to the last fiscal year's total number of full-time permanent, temporary and seasonal workers (temporary and seasonal workers are weighted by their average length of employment during the year). The amount of the last fiscal year's total sales revenues is converted into US dollars (USD), using the period's average official exchange rates, and then deflated using the CPI (base year 2010).[41]

$$lprod_i = \ln \frac{last\ fiscal\ year's\ total\ sales\ revenue_i}{last\ fiscal\ year's\ total\ full\ time\ workers_i} \qquad \textbf{(eq.1)}$$

Where,

$$last\ fiscal\ year's\ total\ full\ time\ workers_i$$
$$= last\ fiscal\ year's\ total\ full\ time\ permanent\ workers_i$$
$$+ last\ fiscal\ year's\ total\ full\ time\ temporary\ and\ seasonal\ workers_i * average\ lenght\ of\ employment / 12$$

[40] We compute total factor productivity (TFP) measure for a subset of firms using a standard Cobb Douglass production function where we regress the logarithm of total annual sales in deflated USD on the logarithm of firms' labour costs, material costs, and capital costs. Information on firm's material and capital costs are missing for 56.4% and 41.7% of the sample respectively.

[41] Made available through the World Development Indicators (World Bank and International Monetary Fund).

As highlighted in table 3.1 (appendix 3), firms' average annual labour productivity is $ 7357, corresponding to an average annual total full-time workforce of 54 workers and an average annual total sales revenues of $ 939175. According to our data, the average labour productivity of the service sector is three times higher than the manufacturing sector. Regarding industries, the chemicals and pharmaceuticals industries report the highest levels of average annual labour productivity, followed by the retail and wholesale industry, and the non-metallic and plastic materials industries. The average annual labour productivity of larger firms is 1.6 higher comparing to medium-sized firms, and 1.2 higher comparing to small firms. More particularly, formal firms perceiving informal competition as a binding constraint report a higher average of labour productivity comparing to formal firms not perceiving informal competition as a binding constraint (figure 5.1, appendix 5).

3.2 Measuring informal firms' competition intensity

In our analysis we will be altering between two measures of informal competition depending on the purpose of the methodology. The first is a subjective variable that reports the perception of formal firms towards informal firms' competition and the second is a city-level indicator of informal competition constructed using the first measure.

The standardised WBES presents information about the intensity of informal firms' competition through the following subjective question;

> *Do you think that the practices of competitors in the informal sector are No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment?*[42]

According to the above question, our first measure of informal firms' competition is a dummy variable ($PERCEIVE_i$) that equals one if the owner of firm (i) perceives the practices of its competitors in the informal sector as a moderate, major or very severe constraint to the daily operation of the firm, and equals zero if the owner perceives it as a minor obstacle or no obstacle.[43] As this first measure is comparable across all the cities included in our sample, we use it to

[42] WBES measure 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.

[43] We transform the discrete perception variable to a dummy variable for ease of interpretation as we are not interested in the differences between the modalities that may constitute the purpose of a different study.

construct a city-level indicator of informal firms' competition that will provide us a more insightful local-level analysis as informal competition is more felt on a local level than a national or international one. It will also help in avoiding any bias resulting from the direct inclusion of the perception variable in our baseline regression.[44]

We construct the underlined indicator using the two-step method developed by Guiso et *al.* (2004), who estimated a regional indicator of financial development in Italy.[45] The first step consists of estimating city-level coefficients reflecting the intensity of informal firms' competition in each city included in our sample. To do so, we regress city-level dummies with other firm-level characteristics on the perception dummy variable using as probit regression as follows;

$$PERCEIVE_i = \alpha_0 + \alpha_1 X_i + \delta_n Cities_n + D_i + \epsilon_i \qquad \textbf{(eq.2)}$$

Where, X_i is the vector of firm-specific attributes that might explain firms' responses such as the firm's age, size, proprietorship status, source of working capital and the quality of the business environment (severity of tax rates, regulations and corruption practices). We also include industry dummies (D_s) and country-industry clusters to control for unobserved factors.

Our variable of interest is $Cities_n$, a set of city-level dummies. Our reference city is Nimba in Liberia which is the city showing the lowest percentage of formal firms perceiving informal competition as a binding constraint. There is an average of 146 formal firms per city. In order to prevent any bias resulting from undersized cities and ensure the statistical reliability of the indicator, cities with less than 20 firms were grouped (see table 2.1, appendix 2). Hence, over the 23 countries included in our sample, 73 cities are included in our first-step regression.

The measure of the city-level indicator of informal competition ($INIC_n$) is provided by the coefficient (δ_n) associated with each city (n). If informal competition does not matter in a given city, then the coefficient associated with this city will not be significant. All cities report positive and significant coefficients, except for two cities where the probability of reporting informal

[44] Perception variables may suffer from underreporting or over reporting behaviors. In our case, formal firms will be more motivated to over-report their answers in order to blame the poor business climate on the existence of informal firms.

[45] Guiso et *al.* (2004)'s paper studied the effects of local financial development by estimating a regional effect of financial development on the probability that a household is excluded from the credit market. This methodology was also used in Ali & Najman (2017), Bagayev and Najman (2014) and Villegas-Sanchez (2009).

competition as a binding constraint is not significantly different to that in our reference region.[46] Hence, compared to firms included in our reference city (Nimba), formal firms located in all the other cities report a higher probability of informal competition intensity being a binding constraint.

The results of the first-step probit estimation are presented in table (1) below.[47] As expected, the probability that formal firms perceive informal competition less severely increases when the obstacles related to tax rates, regulations and corruption practices are alleviated. The effect is similar when firms grow in size, and when they engage in partnership. Moreover, comparing to firms financing their working capital based on internal funds, firms financing it based on non-bank financial institution or on credit from suppliers perceive more severely informal competition, whilst firms financing it from other resources (like friends and family) perceive it less severely. Therefore, according to our estimation, formal firms fearing informal competition the most are usually small, subject to different market constraints (like taxation, corruption and regulations), and their working capital is primarily based on external sources of finance (non-bank institutions, suppliers' credits).

Table 1. First step estimation of $INIC_k$ - Probit estimation

	Probit estimation
$SIZE\_medium_i$ (ref. small firms)	-0.151***
	(0.0393)
$SIZE\_large_i$ (ref. small firms)	-0.433***
	(0.0636)
AGE_i	0.00132
	(0.00134)
$Experience_i$	0.00617***
	(0.00188)
TAX_i	0.265***
	(0.0397)
COR_i	0.334***
	(0.0346)
REG_i	0.356***
	(0.0463)
$SOLE_i$	0.0667*
	(0.0353)
$Working\_capital_i$(ref. internal funds)	
$Working\_capital\_bank_i$	0.0830
	(0.0645)

[46] For these regions, we choose to keep the measure for $INIC_n$ rather than dropping them, since it does not affect our results.

[47] The reported classification of cities by informal competition intensity is robust to other specification (for example, the exclusion of some variables (working capital, industry fixed-effect and clusters), and the inclusion of other variables (ownership status)).

$Working\_capital\_non\_bank_i$	0.414***
	(0.151)
$Working\_capital\_on\_credit_i$	0.114*
	(0.0617)
$Working\_capital\_other_i$ (moneylender, friends, family)	-0.209**
	(0.105)
Constant	-1.268***
	(0.291)
Observations	8,864
pseudo R2	0.1043
$Cities_n$ (ref. Nimba-Liberia)	YES
Industry dummies	YES
Level of se cluster	Country-industry

Notes: the dependent variable $PERCEIVE_i$ is a dummy variable taking the value of one if formal firms perceive informal competition as a binding constraint and zero otherwise. List of variables is provided in table 3.1 (appendix 3). $Cities_n$ is a set of dummies for each city included in the sample. The reference city is Nimba in Liberia. Dummies for industries are included. Robust standard errors are clustered by country-industry level and reported in brackets. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

The second step of our methodology consists in providing measures of informal competition intensity by ranking the coefficients (δ_n) of the city-level dummies included in our probit estimation, as reported in column (3) of Table (2) below. We then transform these measures to our indicator ($INIC_n$) by normalising these coefficients as follows;

$$INIC_n = \frac{\delta_n}{\max(\delta_n)} \qquad \textbf{(eq.3)}$$

Where $INIC_n$ is the city-level indicator of informal competition in city (n) and (δ_n) is the coefficient associated with the city (n). This normalised measure creates an indicator varying between zero and one; zero for cities less subject to informal competition, and one for cities more subject to informal competition.

Table 2. City-level indicator of informal firms' competition intensity ($INIC_n$)

Panel A Lowest 15 cities in informal competition			
City	Country	Coefficient	$INIC_n$
(1)	(2)	(3)	(4)
Nimba	Liberia	0	0
Butare	Rwanda	0.445	0.228088
Diana	Madagascar	0.612	0.313685
Banjul	Gambia	0.629**	0.322399
Arusha	Tanzania	0.639**	0.327524
Mbeya	Tanzania	0.656**	0.336238
Conakry	Guinea	0.668***	0.342389
Kenema	Sierra Leone	0.671*	0.343926
Free-Town	Sierra Leone	0.726***	0.372117

Kindia	Guinea	0.745**	0.381855
Mahajanga	Madagascar	0.748**	0.383393
Beira	Mozambique	0.769***	0.394157
Tigray	Ethiopia	0.779*	0.399282
Bissau	Guinea-Bissau	0.786**	0.40287
Matadi	Democratic Republic of Congo	0.786***	0.40287
Panel B	**Highest 15 cities in informal competition**		
Bobo-Dioulasso	Burkina Faso	1.503***	0.770374
Central DRC	Democratic Republic of Congo	1.513***	0.7755
Mwanza	Tanzania	1.536***	0.787289
Kinshasa	Democratic Republic of Congo	1.548***	0.793439
Maradi & Niamey	Niger	1.568***	0.80369
Kisangani	Democratic Republic of Congo	1.592***	0.815992
Nosy Be	Madagascar	1.592***	0.815992
Zanzibar	Tanzania	1.614***	0.827268
Cotonou	Benin	1.698***	0.870323
Saint-Louis	Senegal	1.710***	0.876474
N'Djamena	Chad	1.720***	0.881599
Jinja	Uganda	1.761***	0.902614
Nampula	Mozambique	1.761***	0.902614
Wakiso	Uganda	1.855***	0.950794
Vakinankaratra	Madagascar	1.951***	1

Notes: city-level dummy coefficients are obtained from a probit estimation of the equation (2) using Standardised WBES over the period 2006-2013. $INIC_n$ is the normalized measure of the city-level indicator of informal competition computed as in equation (3). Panel (A) lists the 15 cities displaying the lowest intensities of informal competition. Whereas Panel (B) lists the 15 cities displaying the highest intensities of informal competition. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

Table (2, column 4) lists the city-level indicator of informal competition that will be used in our analyses. These indicator allows us to gain a global view of the intensity of informal competition in each of the cities included in our sample. Comparing panel (A) and (B), we can first remark that formal firms most subject to informal competition are those located in capital cities (as in N'Djamena (Chad)), in big populated cities (as in Wakiso (Uganda) and Vakinankaratra (Madagascar)), and in large economic cities (as in Nampula (Mozambique) and Jinja (Uganda)). This finding is in line with the fact that informal firms are usually more concentrated in capital cities and in large cities with large economic activity where they typically find the highest level of demand and the largest numbers and varieties of consumers.

On average per country, firms located in cities of East and West African countries are almost equally divided between the two panels. However, firms located in cities of Central African countries appear only in Panel (B) (high $INIC_n$). Moreover, comparing to Anglophone African countries, the highest levels of $INIC_n$ are reported in cities located in Francophone African countries. These findings mirror the fact that the average informal economy (in percentage of

GDP) is more important in central African countries than in Western or Eastern African countries. Also, according to the "Ease of Doing Business" index and the "Regulatory Quality" estimate, it is sometimes easier to do business in Anglophone African countries than in Francophone African countries (see table 1.1, appendix 1). In addition, according to Benjamin et *al.* (2012), West African francophone countries suffer from large institution imperfections manifested at the level of corruption, tax collection, lack of cooperation between business agencies and weak enforcement of the law.

To conclude, our findings provide useful insights about the importance of analysing informal firm's competition, and informality in general, on a local-level as suggested by González and Lamanna (2007). Our findings also confirm the strong prevalence of informal competition across the different cities of low-income Sub-Saharan African countries. $INIC_n$ reports a very high average of 0.6 points, which provides a first intuition about the relationship between formal and informal firms that may exist through the competition process (confirming hypothesis 1). It also confirms the reality of most African and developing countries, where informality became the norm. Most particularly, figure 5.1 (appendix 5) shows that the labour productivity of formal firms located in cities with high $INIC_n$ (higher than the mean value) is impressively higher than that of formal firms located in cities with low $INIC_n$. The picture remains the same when comparing "competing" and "non-competing" formal firms. This interesting finding motivates us to empirically test the impact of informal competition on formal firms' productivity, which is the purpose of the next section.

4. Methodology and results

In this section we first determine the productivity gap between "competing" and "non-competing" formal firms using an endogenous switching regression model. Then we estimate the effect of local informal competition $INIC_n$ on formal firms' productivity using an Ordinary Least Square (OLS) estimation. We also introduce some non-linear effects to identify the extent to which the reported effect of informal firms' competition would last. Finally, to check the robustness of our initial results we adopt an instrumental variable approach following the methodology of Fisman & Svensson (2007).

4.1 Endogenous switching regression model - Determining the productivity gap

As highlighted in section (3) and appendices (4 & 5), there are large differences between formal firms' perceiving informal firms' competition as a binding constraint ($PERCEIVE_i = 1$) and formal firms not perceiving it as a binding constraint ($PERCEIVE_i = 0$), especially in terms of

labour productivity. That's why we start our estimation of the effect of informal firms' competition on formal firms' productivity by implementing an endogenous switching regression model that allows us to estimate the productivity gap between the two groups of formal firms.[48]

Formal firms' managers are asked to make a decision about their perception towards informal competition based on the following regression function;

$$I^* = X\beta + \varepsilon \qquad \textbf{(eq.4)}$$

Where, X is a vector of characteristics that are associated with formal firms' probability to perceive informal competition as a binding constraint, and $\varepsilon_1$is the disturbance term.

Assuming that the productivity of each group is determined as follows;

$$lprod_1 = Z\gamma_1 + u_1 \qquad \textbf{(eq.5)}$$

$$lprod_0 = Z\gamma_0 + u_0 \qquad \textbf{(eq.6)}$$

Where, $lprod_1$ is the logarithm of labour productivity of formal firms perceiving informal firms' competition as a binding constraint ($PERCEIVE_i$=1), $lprod_0$ is the logarithm of labour productivity of formal firms not perceiving informal firms' competition as a binding constraint ($PERCEIVE_i$=0), and Z is a vector of productivity determining variables.

Assuming that all productivity determining variables also influence formal firms' probability of perceiving informal firms' competition as a binding constraint, we have;

I = 1 if $X\beta + \varepsilon > 0$ ($PERCEIVE_i$=1) **(eq.7)**

I = 0 if $X\beta + \varepsilon < 0$ ($PERCEIVE_i$=0) **(eq.8)**

Hence, $X, \gamma_1 \; and \; \gamma_0$ are the vector of parameters to be estimated using full information maximum likelihood method (FIML), assuming that ε, u_1 and u_0 are jointly normally distributed with a mean vector zero, and a covariance matrix as follows;

$$\Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{10} & \sigma_{1\varepsilon} \\ \sigma_{10} & \sigma_0^2 & \sigma_{0\varepsilon} \\ \sigma_{1\varepsilon} & \sigma_{0\varepsilon} & 1 \end{pmatrix} \qquad \textbf{(eq.9)}$$

Where, $var(u_1) = \sigma_1^2, var(\,u_0) = \sigma_0^2, var(\varepsilon) = \sigma^2 = 1, cov(u_1, u_0) = \sigma_{10}, cov(u_1, \varepsilon) = \sigma_{1\varepsilon}, and\; cov(u_0, \varepsilon) = \sigma_{0\varepsilon}$.

[48] See Van der Gaag & Vijverberg (1988); Lokshin & Sajaia (2004) for more details about the endogenous switching regression model.

All the explanatory variables included in the productivity equation are included in the selection equation (formal firms' perception towards informal firms' competition). In addition to these variables, the selection equation includes two more variables to improve the specification; the constraints related to taxation and regulations. We believe that these two variables strongly influence formal firms' perception towards informal competition because they are considered as the main driver of informality. The estimation results of the selection equation reported in table (3, column 1), confirm, once again, that smaller firms suffering burdensome taxation and regulations are more subject to informal firms' competition. Estimated coefficients are also very similar to those reported in the first-step probit estimation of Guiso et *al.* (2004)'s methodology (table 1).

Comparing between the intercepts of columns (2) and (3), we can notice a significant productivity gap. The labour productivity of "competing" formal firms is significantly higher than the productivity of "non-competing" formal firms. The correlation coefficients $\rho_{0\varepsilon}$ and $\rho_{1\varepsilon}$ are both negative but significant only for the correlation between the perception selection equation and the productivity equation of "competing" firms ($PERCEIVE_i$=1). Hence, "competing" formal firms are more productive than a random selection of firm from the sample. However, the productivity of "non-competing" formal firms is not significantly different than a random selection of firms. According to our estimation, the reported productivity gap results mainly from the ability of "competing" firms to grow in size, to export, to better acquire internationally-recognized quality certification and certified financial statements, and to more efficiently engage in partnerships and foreign private ownerships. These results provide a first insight about the positive outcomes that the relationship between formal and informal firms could generate through competition (hypothesis 1).

In order to validate these initial findings, we present an alternative methodology in table (3, column 4) that applies a 2SLS estimation of the effect of the subjective perception variable of informal competition ($PERCEIVE_i$) on the productivity of formal firms ($lprod_i$). In the first step, we predict the value of the perception variable ($PERCEIVE_i$) using a probit estimation that accounts for the effects of regulation (REG_i) and taxation (TAX_i), as well as all the explanatory variables included in our previous productivity equations (equations 5 & 6). Then, in the second step we estimate the effect of the predicted perception variable ($\widehat{PERCEIVE_i}$) on the labour productivity of formal firms using an OLS estimation. Similarly, the results show that "competing" formal firms

are significantly more productive than "non-competing" formal firms, which validate the existence of a significant productivity gap as reported by the endogenous switching regression model.

Table 3. Endogenous switching regression model and 2SLS estimation - Determining the productivity gap

	Endogenous switching regression model			2SLS estimation
	Selection equation (equation 4)	Productivity equations $PERCEIVE_i$=1 (equation 5)	Productivity equations $PERCEIVE_i$=0 (equation 6)	Second stage
	(1)	(2)	(3)	(4)
Intercept	0.647***	4.198***	3.795***	3.469***
	(0.185)	(0.283)	(0.453)	(0.277)
$\widehat{PERCEIVE_i}$				0.445**
				(0.208)
$SIZE\_medium_i$ (ref. small firms)	-0.0594	0.134*	0.0106	0.0888*
	(0.0380)	(0.0688)	(0.0742)	(0.0490)
$SIZE\_large_i$ (ref. small firms)	-0.284***	0.324**	-0.0695	0.0733
	(0.0611)	(0.136)	(0.110)	(0.0867)
AGE_i	0.000541	0.00244	0.00851***	0.00550***
	(0.00136)	(0.00228)	(0.00257)	(0.00164)
$Experience_i$	0.00519***	-0.00291	0.000511	-0.00136
	(0.00180)	(0.00322)	(0.00345)	(0.00232)
$SOLE_i$	0.00393	-0.250***	-0.414***	-0.314***
	(0.0342)	(0.0621)	(0.0645)	(0.0435)
EXP_i	-0.00486***	0.00631***	-0.000832	0.00163
	(0.000851)	(0.00198)	(0.00156)	(0.00119)
FI_CERT_i	0.00627	0.557***	0.581***	0.571***
	(0.0343)	(0.0608)	(0.0636)	(0.0426)
$Quality_i$	-0.0522	0.496***	0.413***	0.473***
	(0.0440)	(0.0841)	(0.0846)	(0.0574)
$Ownership_i$ (ref. private domestic)				
$Ow\_private\_foreign_i$	-0.137***	0.628***	0.413***	0.497***
	(0.0469)	(0.0962)	(0.0862)	(0.0618)
Ow_gov_i	0.273	-0.286	-0.258	-0.244
	(0.220)	(0.382)	(0.457)	(0.296)
TAX_i	0.282***			
	(0.0333)			
REG_i	0.339***			
	(0.0395)			
$\ln\sigma_0$			0.393***	
			(0.0232)	
$\rho_{0\varepsilon}$			-0.0104	
			(0.109)	
$\ln\sigma_1$		0.588***		
		(0.0414)		
$\rho_{1\varepsilon}$		-0.715***		
		(0.111)		
Log likelihood		-20439.148		
Likelihood ratio test of independent equations		39.80***		

Observations	8,231	8,231	8,231	8,366
R-squared				0.274
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes

Notes: columns (1-3) are estimated using full information maximum likelihood estimation of an endogenous switching regression model. Parameters in column (1) are obtained from the regression of the selection equation (4). Parameters in column (2 & 3) are obtained from the regression of the productivity equations (5 & 6). Column (4) is estimated using a 2SLS estimation. List of variables is provided in table 3.1 (appendix 3). Robust standard errors are reported in brackets. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

4.2 OLS estimation - Determining the impact of informal firms' competition on formal firms productivity

As the endogenous switching regression model provides a first intuition about the difference in productivity by formal firms' perception towards informal firms' competition, we continue our analysis by estimating the impact of local informal competition intensity on formal firms' labour productivity using an OLS estimation. Our initial equation takes the following form;

$$lprod_i = \beta_0 + \beta_1 INIC_n + \beta_2 Z_i + \alpha_t + \alpha_s + \alpha_c + \varepsilon_i \qquad \textbf{(eq.10)}$$

Where $lprod_i$ is the logarithm of annual labour productivity of formal firm (i) in deflated USD, $INIC_n$ is the constructed city-level indicator of informal competition varying across cities (n); Z_i is the vector of control variables determining formal firms' productivity; (α_t), (α_s) and (α_c) control respectively for the firm's interview year, the firms' industry and the country in which the firm operates.

Yet, our initial equation reveals two econometric biases. The first is the reverse causality bias since informal competition and formal firms' productivity are jointly determined; informal firms' competition may directly affect formal firms' productivity and vice versa. The second is the omitted variable bias due to unobservable regional effects. We attempt to partly eliminate these biases in our baseline regression using two techniques. First, we use the constructed indicator $INIC_n$ as a measure for the intensity of informal competition. This indicator is constructed from a two-step methodology that is equivalent to the implementation of a two-stage least squares procedure which provides a control by city.[49] Differently from the measure of formal firms' labour productivity, $INIC_n$ varies across the cities of each country but remains constant when comparing firms located in the same city. Thus, we can assume that the intensity of informal competition in city (n) does not directly affect the productivity of formal firms (i) located in city (n). Second, we

[49] See Friedman (1957) and Krueger & Angrist (2001) for a review of using two-stage methodologies and group averages techniques to solve econometric biases.

control for unobserved year, industry and country specific factors that might affect our specification. These techniques allow us to be less subject to criticism about omitted variable bias or model specification error. It also allows us to prevent any bias linked to the usage of subjective variables ($PERCEIVE_i$) as done in table (3, column 4).

The estimation results of the initial equation are reported in table (4) below. As we can first remark, the city-level indicator of informal competition reports a positive and significant effects that remains valid when controlling for the source of firms' working capital (columns 1 & 2). As already mentioned, we include country dummies in all our regressions in order to limit potential omitted variables. However, as four countries in our sample comprise only one city, including country dummies may drop the effect of $INIC_n$ for these four cities/or/countries. That's why we test the robustness of our results to the exclusion of country dummies. As shown in column (3), the coefficient of $INIC_n$ remains positive and very significant, but almost tripled because of potential omitted variables. That's why we choose to keep country dummies in all upcoming regressions. Moreover, table 6.1 (appendix 6) confirms the robustness of our baseline result to the exclusion of firms with very large sales, firms located in countries that were experiencing conflicts or wars during the collection of the data, and firms located in countries with natural resources. We also show that our initial results remain valid when using TFP measure instead of labour productivity measure for a subset of firms.[50]

This positive effect means that the higher is the intensity of informal firms' competition in a given city (n), the higher is the productivity of formal firms located in that city. Therefore, informal competition should not be always considered as a threat to the economy (see section 2). Yet, informal competition acts as a catalyst of productivity for formal firms. Since informal firms have an advantage in cost that allows them to take market shares from formal firms, informal competition pushes formal firms to boost productivity, by better allocating their resources, in order to overcome informal firms' cost advantage and regain market shares. Hence, through competition informal firms can generate positive outcomes to the economy and prove their entrepreneurial capacity (confirming Hypothesis 1 and 2).

Our regressions consider some of the most important elements that enhance productivity. Columns (1-3, table 4 below) show that medium and large-sized formal firms are not doing better

[50] The effect of $INIC_n$ on formal firms' productivity must be interpreted with cautions when using TFP measure because it is significant only when excluding country dummies.

or worse than smaller firms. Also, exporting firms are not significantly better than non-exporting firms. These surprising effects are probably due to measurement error, since the data do not take into account the amount of informal employment in formal firms that is very common in developing countries. It could be also due to firms' inability to create economies of scales as emphasized by Pack (1993) and Kuada (2013) who put forward the factors hindering the industrialization and internationalization of firms in Sub-Saharan African countries.

However, when firms get older, their productivity increase because they become more established in terms of stronger human and financial capitals. Furthermore, individual proprietorship appears to have a negative effect on the labour productivity of formal firms compared to other legal forms (partnership, limited partnership, cooperative). These latter arrangements enable the firm to obtain more financial capital and collaterals, which give them easier access to different sources of finance. Similarly, firms' productivity increase up to 50% with internationally-recognized quality certifications, with certified financial statements and with private foreign ownerships (comparing to private domestic and government ownerships). However, only 16% of formal firms in the sample reported having quality certification and only 14% reported being foreign-owned.

Regarding firms' source of capital, column (2, table 4 below) shows that firms with working capital financed through banks, non-bank institutions or suppliers' credits (external sources) are more productive than firms financing their working capital on internal funds (internal sources). However, these last are more productive than firms providing their working capital from friends, moneylenders and relatives. Hence formal firms facing more severe obstacles in accessing external sources of finance are usually less productive. This is the case of most of firms included in our sample since more than 50% of them perceive access to finance as a major or very severe constraint (*i.e.* 83% of them have a working capital based primarily on internal earning and only 1.6% have access to credits).

Even though we found out that local informal competition has a positive effect on formal firms' productivity, we should not ignore the fact that formal firms usually consider informal competition as a constraint because this type of competition remains "unfair" (based on avoiding taxes and regulations and other market's considerations). That's why we include some non-linear effect to identify the cut-off point of the reported positive effect. As shown in equation (11) below, we interact our indicator of informal firms' competition ($INIC_n$) with three other variables that control for scale effects ($Size_i$), sector specific effects ($Sector_i$) and state regulations (REG_n).

$$lprod_i = \partial_0 + \partial_1 INIC_n X\ channel_{i,n} + \partial_2 Z_i + \alpha_t + \alpha_s + \alpha_c + \varepsilon_i \quad \textbf{(eq.11)}$$

Where, $channel = Size_i, Sector_i, REG_n$

As reported in columns (4-6), the effect of $INIC_n$ remains positive and very significant, which means that local informal competition continues to have a significant positive impact on formal firms' productivity even when non-linear effects are introduced into the specification. Regarding the first interaction, we realise that the reported positive effect of $INIC_n$ could be strengthen for larger firms comparing to smaller firms, because larger firms are more susceptible to boost productivity by creating economies of scales and by better allocating their resources.

In contrast, the second and third interactions show that the reported positive effect of $INIC_n$ could be reduced when firms operate in the manufacturing sector (comparing to the service sector) and when labour regulations, computed at the city-level, are more stringent for formal firms. As the informal sector is more actively operating in the service sector than the manufacturing sector (Amin. 2010), the effect of informal firms' competition is more prominent in the service sector. And even though labour regulations might act as a protector for formal firms competing against informal ones (as suggested by the direct positive and significant effect of the regulation variable), more severe labour regulations can reduce the positive effect of informal firms' competition. The higher is the severity of labour regulations, the higher is the differential in cost between formal and informal firms and the harder is the ability of formal firms to better allocate resources elsewhere to boost productivity.

To summarize our results, we can testify that even if it is normal and expected that formal firms fear informal competition, not all informal competition is a threat. Our empirical findings show that informal competition, analysed on a local level, can positively and significantly affect the productivity of formal firms. Hence, through competition, informal firms can have an entrepreneurial capacity that allows them to engage in an efficient relationship with formal firms that generates positive outcomes to the economy (confirming hypothesis 1 and 2). Yet, as proposed by hypothesis 3, these positive outcomes depends on other factors that account for formal firms' size, sector of activity and labour regulations' constraints.

Table 4. OLS estimation - The effect of informal firms' competition on formal firms' labour productivity

				Interaction with		
				size	sector	regulation
	(1)	(2)	(3)	(4)	(5)	(6)
$INIC_n$	0.499***	0.403**	1.490***	0.474**	0.694***	1.518***
	(0.177)	(0.197)	(0.443)	(0.188)	(0.133)	(0.231)
$SIZE\_medium_i$ (ref. small firms)	0.0705	0.0550	0.0502	0.148	0.0708	0.0701
	(0.0478)	(0.0473)	(0.103)	(0.127)	(0.0811)	(0.0811)
$SIZE\_large_i$ (ref. small firms)	0.0283	-0.00872	0.0316	-0.379	0.0254	0.0196
	(0.0843)	(0.0844)	(0.150)	(0.251)	(0.138)	(0.137)
AGE_i	0.00534***	0.00468***	0.0106***	0.00521**	0.00546**	0.00569**
	(0.00163)	(0.00163)	(0.00402)	(0.00204)	(0.00201)	(0.00202)
$Experience_i$	6.49e-06	0.000552	0.000782	0.000133	6.81e-05	-0.000172
	(0.00210)	(0.00225)	(0.00259)	(0.00218)	(0.00214)	(0.00212)
$SOLE_i$	-0.318***	-0.292***	-0.413***	-0.319***	-0.318***	-0.315***
	(0.0422)	(0.0419)	(0.0913)	(0.0366)	(0.0363)	(0.0368)
EXP_i	0.00131	0.000951	0.000411	0.00133	0.00131	0.00144
	(0.00116)	(0.00126)	(0.00311)	(0.00132)	(0.00135)	(0.00137)
FI_CERT_i	0.572***	0.550***	0.508***	0.570***	0.571***	0.570***
	(0.0422)	(0.0444)	(0.101)	(0.0576)	(0.0571)	(0.0580)
$Quality_i$	0.472***	0.429***	0.447***	0.474***	0.470***	0.467***
	(0.0571)	(0.0622)	(0.0748)	(0.0363)	(0.0364)	(0.0365)
$Ownership_i$ (ref. private domestic)						
$Ow\_private\_foreign_i$	0.485***	0.508***	0.392***	0.487***	0.486***	0.488***
	(0.0571)	(0.0611)	(0.122)	(0.0519)	(0.0525)	(0.0524)
Ow_gov_i	-0.324	-0.285	-0.336	-0.318	-0.333	-0.315
	(0.320)	(0.284)	(0.304)	(0.517)	(0.511)	(0.505)
$Working\_capital_i$ (ref. internal funds)						
WK_Bank_i		0.393***				
		(0.0836)				
$WK\_Non\_Bank_i$		0.412*				
		(0.211)				
$WK\_Supplier_i$		0.226***				
		(0.0603)				
WK_Other_i		-0.281**				
		(0.109)				
$INIC_n$ X $SIZE\_medium_i$				-0.122		
				(0.221)		
$INIC_n$ X $SIZE\_large_i$				0.672**		
				(0.309)		
$Manufacturing_i$					0.141	
					(0.129)	
$INIC_n$ X $Manufacturing_i$					-0.341*	
					(0.174)	
Av_REG_n						2.275***
						(0.502)
$INIC_n$ X Av_REG_n						-3.793***
						(0.517)
Constant	3.347***	3.352***	2.651***	3.374***	3.289***	2.802***
	(0.266)	(0.279)	(0.402)	(0.208)	(0.157)	(0.204)

Observations	8,487	8,050	8,487	8,487	8,487	8,487
R-squared	0.274	0.273	0.239	0.274	0.274	0.275
Year dummies	yes	yes	Yes	yes	yes	yes
Industry dummies	yes	yes	Yes	yes	yes	yes
Country dummies	yes	yes	No	yes	yes	yes
Level of se cluster	-	-	Country	Industry	Industry	Industry

Notes: the dependent variable is the logarithm of formal firms' annual labour productivity in deflated USD. $INIC_n$ is the city-level indicator of informal competition. In column (2), we control for the firms' access to different sources of finance. In column (3), we exclude country dummies and we cluster our regression by country-year. In columns (4-6) we introduce non-linear effects that account for firms' size, sector of activity and regulations' constraint. List of explanatory variables is provided in table 3.1 (appendix 3). We control for firm's interview year, industry and country. Non-parametric robust bootstrapped standard errors (500 replications) are reported in brackets in columns (1-3). Robust standard errors are clustered at the industry level and are reported in brackets in columns (4-6). *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

4.3 Instrumental variable approach - Robustness check to the positive effect of informal firms' competition

In a second attempt to fully eliminate the underlined econometrics biases, we adopt an instrumental variable approach following Fisman and Svensson (2007) methodology who used grouped averages by location and industry as instruments to test the relationship between corruption, taxation and firms' growth in Uganda. Their methodology is a way to limit the endogeneity and omitted variables biases. It allows us to test simultaneously the relationship between informal competition, taxation and formal firms' productivity by instrumenting for the endogenous variables of interest (informal competition and taxation) by their grouped averages by city and industry as follows;

$$\widehat{PERCEIVE}_i = \sigma_0 + \sigma_1 PERCEIVE_{ns} + \vartheta_s + \vartheta_r + \mu_i \quad \textbf{(eq.12)}$$

Where, $cov(PERCEIVE_{ns}, \mu_i) = 0$

$$\widehat{Taxation}_i = \theta_0 + \theta_1 TAX_{ns} + \vartheta_s + \vartheta_r + \varepsilon_i \quad \textbf{(eq.13)}$$

Where, $cov(TAX_{ns}, \varepsilon_i) = 0$

$$lprod_i = \delta_0 + \delta_1 \widehat{PERCEIVE}_i + \delta_2 \widehat{Taxation}_i + \delta_3 Z_i + \vartheta_s + \vartheta_r + \epsilon_i \quad \textbf{(eq.14)}$$

Where, $cov(Z_i, \epsilon_i) = 0, cov\left(\widehat{PERCEIVE}_\iota, \epsilon_i\right) = 0, cov\left(\widehat{Taxation}_\iota, \epsilon_i\right) = 0$

Where, $\widehat{PERCEIVE}_i$ is the estimated formal firms' perceptions towards informal firms' competition, estimated using the average of $PERCEIVE_{ns}$ at the city-industry-levels (ns). $\widehat{Taxation}_i$ is the estimated formal firms' perception towards tax rates, estimated using the average of TAX_{ns} at the city-industry-levels (ns). $lprod_i$ is the logarithm of annual labour productivity of the formal firm (i) in deflated USD, and Z_i is a vector of firms' specific attributes affecting the endogenous variables and formal firms productivity. We also add fixed effects to control for firms'

industries (ϑ_s) and location in Africa (Central, East or West Africa, ϑ_r), and we include clusters by city and industry.

We choose to add the effect of taxation to our analysis because we believe that taxation and informality are strongly interlinked. When we think about the informal sector, we directly think about taxation as it is the main driver of informality. Similarly, increasing informality is the main cause of the reduction of the tax base that deprives the government to provide public services to the formal sector (Loayza, 1996; Amin, 2009). It has also been found that taxation is the main channel through which informal competition affects formal firms' productivity. As tested in Ali & Najman (2017), a better and more efficient tax policy (implies the reduction of tax rates and tax administrative procedures) has a direct positive and significant effect on the productivity of formal firms located in region with moderate to high intensity of informal competition.

Yet, similarly to the disarray arising from the impact of the informal sector, the impact of taxation on firms' growth remains an ongoing debate. In fact, tax registration and corporate taxes could be sometimes associated with higher profits and better access to credits, especially for micro and small enterprises (Fajnzylber et *al.*, 2006; McKenzie & Sakho, 2010). However, corporate taxes is usually associated with lower investment and entrepreneurship, especially in developing countries where formal firms consider tax rates and tax administration procedures as major and very severe constraints (Djankov et *al.*, 2010; Benjamin et *al.* 2012). According to figure 5.1 (appendix 5) and similarly to informal competition, formal firms perceiving taxation as a binding constraint are impressively more productive than those not perceiving it as a binding constraint.

The data used in this present chapter is appropriate to analyse the effect of informal competition and taxation on formal firms' productivity. First, our sample includes a random set of formal firms across the main industrial categories and cities in low-income sub-Saharan African countries (total of 15 industries and 81 cities).[51] Second, most of firms in the sample are small (63%) which is good for the purpose of this study because small firms are more subject to informal competition comparing to larger firms (as proven in section 3.2). Third, informal firms' competition and taxation are considered as the third and fourth most serious obstacles affecting the operation of firms in our sample (*i.e.* 56% of firms in the sample consider informal competition as a binding constraint and 62% of firms consider taxation as a binding constraints). Fourth, the extent of

[51] Not all cities have firms in all industries. In total there is 776 couples of city-industry. The mean number of firms in each group is 14.

reported informal competition widely varies across firms. As shown by our constructed indicator ($INIC_n$) and our previous results, part of this variation is due to location-specific effects (see section 3.2) and sector-specific effects (see sections 4.2).

In low-income countries, we can synthetize the picture as follows. We have two categories of formal firms; one protected by regulations, as the case of large firms and politically connected firms who are less subject to informal competition, and another less regulated and rather facing intense competition from informal firms. Hence, the intensity of informal competition is the result of multiple interactions between different informal and formal firms, and between these last and the state. Cities included in our dataset are large with high concentration of people (68% of cities in the sample are capital cities or cities with over one million people), and comprise firms with different size and operating across different sectors and industries. Hence, even if it is the firm's manager who makes a decision about the perceived intensity of informal competition, the industry-location average of informal competition will not directly affect the productivity of this specific firm.

Similarly, the amount of taxation is determined by the state depending on the firm's type of activity, its location, its size and its capital. Since cities and industries are composed of many firms with different treatments from the tax administration authority, average taxes by city and industry will not directly affect the productivity of one specific firm. Therefore, even if it's the firm's manager who makes a decision about the severity of perceived taxation, s/he is not the one who makes a decision about the real amount of taxation undergone by his/her firm. That's why the industry-location averages of informal competition and taxation are assumed to be independent from formal firm's productivity ($cov\left(\widehat{PERCEIVE}_\iota, \epsilon_i\right) = 0, cov\left(\widehat{Taxation}_\iota, \epsilon_i\right) = 0$). Moreover, table 7.1 (appendix 7) show that from a statistical point of view, the correlations between formal firms' labour productivity and the two instruments ($PERCEIVE_{ns}$, TAX_{ns}) are very low and insignificant. However, the correlations are high and significant between the endogenous variables and their instruments.

Regarding the result of the first stage regression reported in table 5 (columns 1 & 2), we can first remark that our instruments perform well. The *F*-statistic of their joint significance is respectively 56 and 60 and is highly significant. As expected, the instruments report a negative and significant effect. The higher is the average intensity of informal competition and taxation in a given city and industry, the more severe will be the perception of formal firms, located in that given city and operating in that given industry, towards informal firms' competition and taxation.

Regarding the second stage regression reported in column (3, table 5 below), we can conclude that applying an instrumental variable approach using industry-location averages validates our initial results (section 4.2). Predicted informal competition ($\widehat{PERCEIVE_i}$) has a positive and significant effect on formal firms' productivity. And the effect of other explanatory variables remain unchanged comparing to the initial results. In addition, predicted taxation $\widehat{Taxation_i}$ report also a positive and significant effect on formal firms' productivity. A one percentage point increase in informal competition or taxation increase significantly the productivity of formal firms by 51 and 86 percentage points respectively.

This implies that taxation has a stronger positive effect on firms' productivity than informal firms' competition. Therefore, we can conclude – in complement to the findings of Ali & Najman (2017) - that the direct effect that taxation has on formal firms' productivity implies an indirect effect of informal firms' competition on formal firms' productivity. The higher is the taxation rate, the bigger is the cost differential between formal and informal firms, and the stronger is informal firms' capacity to compete and take market shares. By consequence, formal firms are motivated to boost productivity by adopting more efficient internal organisation techniques and better allocating resources, enabling them to regain market shares. These final results also add to our initial results and confirms our third hypothesis since we found that taxation is an important determinant of the impact of informal competition.

Table 5. Instrumental variable approach - Robustness check

	First stage estimations		Second stage estimation
	$\widehat{PERCEIVE_i}$	$\widehat{Taxation_i}$	
	(1)	(2)	(3)
$\widehat{PERCEIVE_i}$			0.512***
			(0.197)
$\widehat{Taxation_i}$			0.868***
			(0.173)
$PERCEIVE_{ns}$	0.972***		
	(0.0117)		
TAX_{ns}		0.978***	
		(0.0109)	
$SIZE\_medium_i$ (ref. small firms)	-0.0207	-0.00381	0.107*
	(0.0141)	(0.0135)	(0.0636)
$SIZE\_large_i$ (ref. small firms)	-0.0717***	0.00876	0.140
	(0.0215)	(0.0193)	(0.106)
AGE_i	0.000535	0.000270	0.0129***
	(0.000426)	(0.000420)	(0.00215)
$Experience_i$	0.00172***	0.000485	-0.000807
	(0.000615)	(0.000620)	(0.00278)
$SOLE_i$	0.0172	-0.00317	-0.441***
	(0.0119)	(0.0119)	(0.0626)
EXP_i	-0.000874***	-0.000476*	-0.00153

	(0.000304)	(0.000261)	(0.00145)
FI_CERT_i	0.0165	0.0237*	0.517***
	(0.0133)	(0.0127)	(0.0609)
$Quality_i$	-0.00452	0.0227	0.412***
	(0.0179)	(0.0147)	(0.0707)
$Ownership_i$ (ref. private domestic)			
$Ow\_private\_foreign_i$	-0.0492***	-0.0202	0.430***
	(0.0167)	(0.0146)	(0.0753)
Ow_gov_i	0.0612	-0.293***	0.0836
	(0.0805)	(0.0570)	(0.302)
Constant	0.0127	-0.0148	2.617***
	(0.0226)	(0.0195)	(0.355)
Observations	8,279	8,279	8,279
R-squared			0.116
F-test of first stage	56.07 {0.0000}	60.21 {0.0000}	
Industry dummies	Yes	Yes	Yes
Regions dummies	Yes	Yes	Yes
Level of se cluster	City-Country	City-Country	City-Country

Notes: this table shows the results of the instrumental variable approach following Fisman & Svensson methodology (2007). The results of the first stage estimation are reported in columns (1 & 2), where $\widehat{PERCEIVE_i}$ is the predicted value of informal competition instrumented using the average of informal firms' competition by city and industry ($PERCEIVE_{ns}$), and $\widehat{Taxation_i}$ is the predicted value of taxation instrumented using the average of taxation by city and industry (TAX_{ns}). The dependent variable in the second stage estimation is the logarithm of formal firms' annual labour productivity in deflated USD. List of explanatory variables is provided in table 3.1 (appendix 3). We control for firm's industry and region. *F*-test of first stage is the test statistic on the F-test of the joint significance of the instruments in the first-stage regressions, with p-values in braces. Robust standard errors are clustered at the city-country level and are reported in brackets in all columns. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

5. Conclusion

This chapter investigates the effect of competition stemming from informal firms on the productivity of formal firms in 23 low-income Sub-Saharan African countries. We update the two-step methodology of Guiso et *al.* (2004) to construct a local indicator of informal competition intensity using a pooled sample of 10718 formal firms extracted from the standardised World Bank Enterprise Surveys over the period 2006-2013. We start our analysis by implementing an endogenous switching regression model that confirms the existence of a significant productivity gap in favour of formal firms perceiving informal firms' competition as a binding constraint comparing to those who do not. We then estimate the effect of our constructed indicator on the labour productivity of formal firms included in our sample.

Unlike the majority of studies focusing on the informal sector (Singer, 1970; Lewis, 2004; Perry et *al.*, 2007; etc.), we conclude that the presence of informal firms is not always as harmful as it is usually considered. Our results report a positive and significant effect of local informal competition on formal firms' productivity. Hence, more intense competition stemming from informal firms can drive formal firms to become more productive, to overcome informal firms' advantage in cost. In addition, by introducing some non-linear effects, we show that the reported positive effect of

informal competition on formal firms' productivity is segmented by formal firms' size, sector of activity and burdensome regulations.

We test the validity of our initial results by adopting an instrumental variable approach that helps eliminating the endogeneity and omitted variable bias that may occur. We follow Fisman & Svensson (2007) methodology by testing the relationship between informal competition, taxation and formal firms' productivity, using group averages by location and industries as instruments. Our results remain robust to the initial estimation's result. We find that the direct effect of taxation on formal firms' productivity implies an indirect effect of informal competition on formal firms' productivity. The higher is the taxation rate, the bigger is the cost differential between formal and informal firms, and the stronger is informal firms' capacity to compete and take market shares. By consequence, formal firms are motivated to boost productivity by adopting more efficient internal organisation techniques and by better allocating resources, enabling them to regain market shares.

This chapter contributes to the existing literature in different ways. First, we provide, for the first time, empirical estimates on the effect of informal competition on the productivity of formal firms by introducing a city-level indicator of informal competition. We then extend our estimation to a large sample of low-income Sub-Saharan African countries. Second, we emphasise a new type of competition that should be considered more often, because of the growing number of informal firms in the developing world. Third, we adopt existing econometrics techniques to introduce non-linear effects that could explain more extensively the business environment associated with informal competition. Fourth, our results add to the literature on African economic growth by indicating the mechanisms through which the informal sector can be considered as an economic resource rather than a threat.

References

Ali, N., Najman, B. (2017). Informal competition, firms' productivity and policy reforms in Egypt. In Horodnic, I.A., Rodgers, P., Williams, C. C., & Momtazian, L. (Eds). *The informal economy: exploring drivers and practices.* Abingdon, UK: Routledge *(in press)*

Amin, M. (2009). Obstacles to Registering: Necessity vs. Opportunity Entrepreneurs. (Working paper No. 53032). Washington, DC: World Bank.

Amin, M. (2010). How do manufacturing and service firms differ within the informal sector. (Entreprise note No. 14). Washington, DC: International Finance Corporation, World Bank.

Amor-s, J., Couyoumdjian, J., Cristi, O., & Minniti, M. (2016). The bottom-up power of informal entrepreneurship. In Sauka, S., Schneider, F., & Williams, C. C. (Eds.). *The bottom-up power of informal entrepreneurship* (pp. 9-29). Cheltenham, UK: Edward Elgar Publishing.

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2008). How important are financing constraints? The role of finance in the business environment. *The World Bank Economic Review*, *22*(3), 483-516.

Bagayev, I., & Najman, B. (2014). *Money to fill the gap? Local financial development and energy intensity in Europe and Central Asia* (No. 55193). University Library of Munich, Germany.

Bangasser, P. E. (2000). *The ILO and the informal sector: an institutional history*. Geneva, Switzerland: International Labour Office.

Benjamin, N., Mbaye, A. A., & Diop, I. T. (2012). *The informal sector in Francophone Africa: firm size, productivity, and institutions*. Washington, DC: World Bank: World Bank Publications.

Bigsten, A., Kimuyu, P., & Lundvall, K. (2004). What to do with the Informal Sector?. *Development Policy Review*, *22*(6), 701-715.

Bloom, N., Genakos, C., Martin, R., & Sadun, R. (2010). Modern Management: Good for the Environment or Just Hot Air?*. *The Economic Journal*, *120*(544), 551-572.

Böhme, M., & Thiele, R. (2012). Is the informal sector constrained from the demand side? Evidence for six West African capitals. *World Development*, *40*(7), 1369-1381.

Castells, M., & Portes, A. (1989). World Underneath: The Origins, Dynamic and Effects of the Informal Economy. In Portes, A., Castells, M., & Benton, L. A. (Eds.). *The Informal Economy: Studies in Advanced and Less Developed Countries* (pp. 11-40). Baltimore, MD: Johns Hopkins University Press.

Charmes, J. (2012). The informal economy worldwide: trends and characteristics. *Margin: The Journal of Applied Economic Research*, *6*(2), 103-132.

Chen, M. A. (2012). The informal economy: Definitions, theories and policies. (*Working Paper* No.1). Cambridge, MA, USA: Women in informal economy globalizing and organizing (WIEGO)

CPIA Africa (2015). *Assessing Africa's policies and institutions.* Washington, DC: World Bank.

De Soto, H. (1990). *The other path: The invisible revolution in the third world.* New York: Harper and Row.

Djankov, S., Ganser, T., McLiesh, C., Ramalho, R., & Shleifer, A. (2010). The effect of corporate taxes on investment and entrepreneurship. *American Economic Journal: Macroeconomics*, *2*(3), 31-64.

Duchêne, G., & Rusin, P. (2002). Micro-entreprises, croissance et mutations de l'emploi dans les pays en transition. Revue économique, *53*(3), pp. 637-646.

Eifert, B., Gelb, A., & Ramachandran, V. (2005). Business environment and comparative advantage in Africa: Evidence from the investment climate data. (Working paper No. 56). Washington, D.C., United States: Center for Global Development.

Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank.

Fajnzylber, P., Maloney, W. F., & Montes Rojas, G. V. (2006). Releasing constraints to growth or pushing on a string? The impact of credit, training, business associations, and taxes on the performance of Mexican micro-firms. (World Bank Policy Research Working Paper 380). Washington, DC: World Bank.

Fisman, R., & Svensson, J. (2007). Are corruption and taxation really harmful to growth? Firm level evidence. *Journal of Development Economics*, *83*(1), 63-75.

Friedman, M. (1957). *A theory of the consumption function: A study by the National Bureau of Economic Research*. Princeton, New Jersey, United States: Princeton University Press.

Friesen, J., & Wacker, K. (2013). Do Financially Constrained Firms Suffer from More Intense Competition by the Informal Sector? Firm-Level Evidence from the World Bank Enterprise Surveys. (Discussion Paper No. 139). Göttingen, Germany: Courant Research Centre.

Gardes, F., & Starzec, C. (2009). Polish households' behavior in the regular and informal economies. *Revue économique*, *60*(5), 1181-1210.

Godfrey, P.C. (2015). Introduction: Why the informal economy matters to management. In Godfrey, P.C. (Ed.) *Management, society, and the informal economy* (pp. 1–20). London, UK: Routledge.

Gonzalez, A. S., & Lamanna, F. (2007). *Who fears competition from informal firms? Evidence from Latin America* (Report No. 4316). Washington, DC: The World Bank.

Grimm, M., & Günther, I. (2005). Inter-and intra-household linkages between the informal and formal sector: a case study for Urban Burkina Faso. (Research paper No. 2005/14). WIDER Research Papers, United Nations University (UNU).

Guiso, L., Sapienza, P., & Zingales, L. (2004). Does local financial development matter?. *The Quarterly Journal of Economics*, *119*(3), 929–969.

Gülbiten, Ö., & Taymaz, E. (2000). Are Small Firms Inefficient? A Schumpeterian Analysis of Productivity Differentials. *Department of Economics, Middle East Technological University, Ankara*.

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: a two-sector analysis. *The American economic review*, *60*(1). 126-142.

Hart, K. (1973). Informal income opportunities and urban employment in Ghana. *The journal of modern African studies*, *11*(01), 61-89.

International Bank for Reconstruction and Development, & World Bank. (2017). *Doing Business 2017: Equal opportunity for all. Regional Profil 2017. Sub-Saharan Africa (SSA)*. Washington, DC: World Bank.

International Labour Office. (1972). *Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya*. Geneva, Switzerland: International Labour Office.

International Labour Office. (2009). *The informal economy in Africa: Promoting transition to formality: Challenges and strategies*. Geneva, Switzerland: International Labour Office.

International Labour Office. (2012). *Statistical update on employment in the informal economy*. Geneva, Switzerland: International Labour Office.

Jütting, J. (2009). *Is informal normal?: towards more and better jobs in developing countries*. Jütting, J. &. De Laiglesia, J. R. (Eds.). Paris, France: Development Centre of the Organisation for Economic Co-operation and Development.

Krueger, A.B., Angrist, J. (2001). Instrumental variables and the search for identification: from supply and demand to natural experiments?. *Journal of Economic Perspectives, 15*, 69–85.

La Porta, R., & Shleifer, A. (2008). The unofficial economy and economic development. *Brookings Papers on Economic Activity, 2008*(2), 275-363.

La Porta, R., & Shleifer, A. (2014). Informality and Development. *Journal of Economic Perspectives*, *28*(3), 109-126.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester school*, *22*(2), 139-191.

Lewis, W. W. (2004). *The power of productivity: Wealth, poverty, and the threat to global stability*. University of Chicago Press.

Kuada, J. (2013). Industrialization and economic growth. In Lituchy, T. R., Punnett, B. J., & Puplampu, B. B. (Eds.). *Management in Africa: Macro and micro perspectives* (pp. 32-47). Abingdon, UK: Routledge.

Loayza, N. V. (1996, December). The economics of the informal sector: a simple model and some empirical evidence from Latin America. In *Carnegie-Rochester conference series on public policy* (Vol. 45, pp. 129-162)

Lokshin, M., & Sajaia, Z. (2004). Maximum likelihood estimation of endogenous switching regression models. *Stata Journal*, *4*, 282-289.

Maloney, W. F. (2004). Informality revisited. *World development*, *32*(7), 1159-1178

McKenzie, D., & Sakho, Y. S. (2010). Does it pay firms to register for taxes? The impact of formality on firm profitability. *Journal of Development Economics*, *91*(1), 15-24.

Moser, C (1978), Informal Sector or Petty Commodity Production: Dualism or Dependence in Urban Development?. *World Development, 6(*9-10), 1041-1064.

Nickell, S., Nicolitsas, D., & Dryden, N. (1997). What makes firms perform well?. *European Economic Review*, *41*(3), 783-796.

Organisation for Economic Cooperation and Development. (2009). *Competition Policy and the Informal Economy*. Paris, France: OECD.

Pack, H. (1993). Productivity and industrial development in sub-Saharan Africa. *World Development*, *21*(1), 1-16.

Perry, E., Maloney, W. F., Arias, O. S., Fajnzylber, P., Mason, A. D., & Saavedra-Chanduvi, J. (2007). *Informality: Exit and exclusion*. Washington, DC: World Bank Publications.

Saviotti, P. P., & Pyka, A. (2008). Product variety, competition and economic growth. *Journal of Evolutionary Economics*, *18*(3-4), 323-347

Schiffbauer, M., & Ospina, S. (2010). *Competition and firm productivity: Evidence from firm-level data* (No. 10-67). Washington, D.C., United States: International Monetary Fund.

Schneider, F. (2012). The Shadow Economy and Work in the Shadow: What Do We (Not) Know?. (Discussion Paper No. 6423). Bonn, Germany: IZA Institute of Labor Economics.

Schneider, F., & Enste, D. (2000). Shadow economies around the world-size, Causes, and Consequences. (IMF working paper No. 0026). Washington, DC: International Monetary Fund.

Schneider, F., Buehn, A., & Montenegro, C. E. (2010). Shadow Economies all over the World: New Estimates for 162 Countries from 1999 to 2007. (Policy Research Working Paper Series No. 5356). Washington, DC: The World Bank.

Singer, H. W. (1970). Dualism revisited: a new approach to the problems of the dual society in developing countries. *The Journal of Development Studies*, *7*(1), 60-75.

Sparks, D. L., & Barnett, S. T. (2010). The informal sector in Sub-Saharan Africa: out of the shadows to foster sustainable employment and equity?. *The International Business & Economics Research Journal*, *9*(5), 1-11.

Van der Gaag, J., & Vijverberg, W. (1988). A switching regression model for wage determinants in the public and private sectors of a developing country. *The review of economics and statistics*, *70*(2), 244-252.

Villegas-Sanchez, C. (2009). FDI spillovers and the role of local financial markets: evidence from Mexico. *Manuscript, University of Houston*.

Webb, J. W., Bruton, G. D., Tihanyi, L., & Ireland, R. D. (2013). Research on entrepreneurship in the informal economy: Framing a research agenda. *Journal of Business Venturing*, *28*(5), 598-614

Webb, J. W., Tihanyi, L., Ireland, R. D., & Sirmon, D. G. (2009). You say illegal, I say legitimate: Entrepreneurship in the informal economy. *Academy of Management Review*, *34*(3), 492-510.

Williams, C. C. (2014). *Informal Sector Entrepreneurship*. Paris, France: OECD.

Williams, C. C., & Martinez-Perez, A. (2014). Why do consumers purchase goods and services in the informal economy?. *Journal of Business Research*, *67*(5), 802-806.

Williams, C. C., Martinez-Perez, A., & Kedir, A. M. (2016). Informal entrepreneurship in developing economies: the impacts of starting-up unregistered on firm performance. *Entrepreneurship Theory and Practice*.

World Bank. (2013). *World Development Reports: Jobs*. Washington, DC: World Bank.

World Bank (2015). *Doing Business report: Going beyond efficiency*. Washington, DC: World Bank.

World Development Indicators. Washington, DC: World Bank.

Worldwide Governance Indicators (www.govindicators.org)

Young, A. (2012). The African growth miracle. *Journal of Political Economy*, *120*(4), 696-739.

Appendices

Appendix 1

Table 1.1. Characteristics of low-income Sub-Saharan African countries

Countries	Informal economy (%GDP)	Informal employment (%)		GDP growth (%)	Poverty headcount ratio (% population)	Informal competition constraint (% formal firms)	Ease of Doing Business index	Regulatory Quality (estimate)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Benin	49.8	76.9	-	4.2	75.63 (2011)	69.88 (2009)	153	-0.555
Burkina Faso	40.5	65	-	5.4	74.65 (2014)	54.17 (2009)	142	-0.36
Burundi	39.5	-	-	3.6	92.17 (2006)	38.2 (2006)	155	-0.709
Central African Republic	45	-	-	-0.7	82.27 (2008)	45.24 (2011)	186	-1.439
Chad	43.7	38	-	4.8	64.82 (2011)	72 (2009)	183	-1.196
Democratic Republic of Congo	47.3	80	-	6.6	90.7 (2012)	44.93 (2006-2010-2013)	184	-1.344
Ethiopia	38.6	61	**41.4 (2004)**	10.4	71.27 (2010)	14.6 (2011)	159	-1.004
Gambia	44.3	80	-	3.5	68 (2003)	22.42 (2006)	150	-0.493
Guinea	39	79	-	2.15	68.65 (2012)	22.42 (2006)	161	-0.863
Guinea-Bissau	40.9	-	-	3.2	83.59 (2010)	31.45 (2006)	177	-1.197
Liberia	44.2	35	**49.5 (2010)**	6.2	89.61 (2007)	20.14 (2009)	174	-0.881
Madagascar	40.8	57.5	89.3 (2012)	2.7	90.47 (2012)	31.93 (2009-2013)	169	-0.757
Malawi	41.8	51.7	-	5.7	87.64 (2010)	26.26 (2009)	141	-0.818
Mali	40.7	36	**81.8 (2004)**	4.1	77.71 (2009)	44.13 (2007-2010)	143	-0.569
Mozambique	39.8	-	-	7.2	87.54 (2008)	52.12 (2007)	134	-0.494
Niger	40.4	48.9	-	5.6	75.46 (2014)	59.86 (2009)	158	-0.725
Rwanda	40.1	75	-	7.6	80.6 (2013)	25.46 (2006-2011)	59	0.248
Senegal	43.7	62.4	-	3.8	66.26 (2011)	41.7 (2007)	146	-0.178
Sierra Leone	45.6	70	-	2.6	79.96 (2011)	18.12 (2009)	72	-0.866
Tanzania	56.4	42.2	76.2 (2006)	6.4	76.1 (2011)	39.43 (2006-2013)	144	-0.362
Togo	34.9	38.9	-	4	74.54 (2011)	50.69 (2009)	154	-0.82
Uganda	42.3	56.4	93.5 (2013)	6.7	64.95 (2012)	35.08 (2006-2013)	116	-0.242
Zimbabwe	61.8	33.9	40.7 (2004)	2.3	45.5 (2011)	47.84 (2011)	157	-1.646

Notes: column (1) presents the percentage of informal economy in official GDP (period average 1999-2007). Data are from Schneider (2012). Column (2) presents the percentage of informal employment in the total official labour force in 1998. Data are from Schneider (2012). Column (3) presents the percentage of informal employment in total non-agricultural employment for the

last available year (between brackets). Underlined data are from the World Development Indicators, and data in bold are from ILO (2012). Column (4) presents the percentage of annual GDP growth for the period average 2006-2015. Data are from the World Development Indicators. Column (5) presents the poverty headcount ratio at $3.10 a day (2011 PPP) in percentage of population for the last available year (between brackets). Data are from the World Development Indicators. Column (6) presents the percentage of formal firms perceiving informal competition as a major or very severe obstacle for the last available year (between brackets). Data are from the Standardized WBES. Column (7) presents the 2015's ease of doing business index (1=most business-friendly regulations). Data are from the World Development Indicators. Column (8) presents the 2015's Regulatory Quality Estimate (-2.5 to 2.5). Data are from the World Governance indicators. Table computed by the authors.

Appendix 2

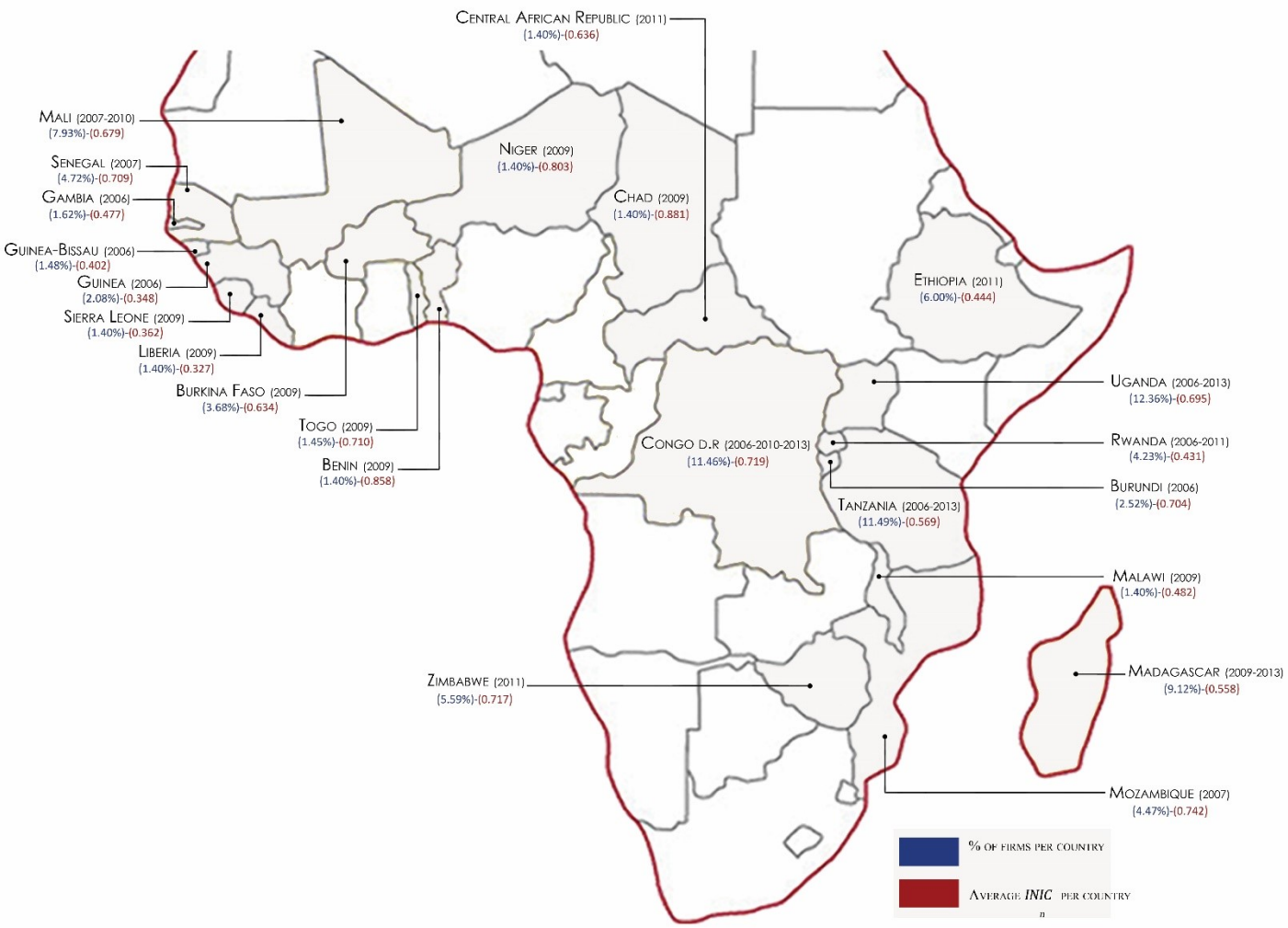
Table 2.1. List of countries and cities included in the sample

Regions	Countries	Formal firms in each country		Cities	Formal firms in each city		
		Total	sample		Total	% country	%sample
Central Africa	Central African Republic (2011)	150	1.40	**Bangui**	142	94.67	1.32
				Berberati	8	5.33	0.07
	Chad (2009)	150	1.40	N'Djamena	150	100.00	1.40
	Democratic Republic of Congo (2006, 2010, 2013)	1228	11.46	Central DRC	68	5.54	0.63
				East DRC	133	10.83	1.24
				Kinshasa	485	39.50	4.53
				Kisangani	50	4.07	0.47
				Lubumbashi	87	7.08	0.81
				Matadi	77	6.27	0.72
				South DRC	72	5.86	0.67
				West DRC	256	20.85	2.39
		1528	**14.26**				
East Africa	Burundi (2006)	270	2.52	Bujumbura	270	100.00	2.52
	Ethiopia (2011)	644	6.01	Addis Ababa	468	72.67	4.37
				Amhara	42	6.52	0.39
				Oromya	81	12.58	0.76
				Snnp	18	2.80	0.17
				Tigray	35	5.43	0.33
	Madagascar (2009-2013)	977	9.12	Analamanga	202	20.68	1.88
				Anosy	39	3.99	0.36
				Antananarivo	340	34.80	3.17
				Antsiranana	44	4.50	0.41
				Atsimo Andrefana	79	8.09	0.74
				Boeny	40	4.09	0.37
				Diana	48	4.91	0.45
				Mahajanga	33	3.38	0.31
				Nosy Be	61	6.24	0.57
				Toamasina	58	5.94	0.54
				Vakinankaratra	33	3.38	0.31
	Malawi (2009)	150	1.40	**Central Malawi**	44	29.33	0.41
				North Malawi	14	9.33	0.13
				South Malawi	92	61.33	0.86
	Mozambique (2007)	479	4.47	Beira	31	6.47	0.29
				Maputo	354	73.90	3.30
				Matola	47	9.81	0.44
				Nampula	47	9.81	0.44
	Rwanda (2006-2011)	453	4.23	Butare	29	6.40	0.27
				Kigali	424	93.60	3.96
	Tanzania (2006-2013)	1232	11.49	Arusha	172	13.96	1.60
				Dar Es Salaam	672	54.55	6.27
				Mbeya	111	9.01	1.04
				Mwanza	85	6.90	0.79
				Pemba	64	5.19	0.60
				Zanzibar	128	10.39	1.19
		1325	12.36	Jinja	123	9.28	1.15

	Uganda (2006-2013)			Kampala	831	62.72	7.75
				Lira	61	4.60	0.57
				Mbale	106	8.00	0.99
				Mbarara	130	9.81	1.21
				Wakiso	74	5.58	0.69
	Zimbabwe (2011)	599	5.59	Bulawayo	150	25.04	1.40
				Harare	339	56.59	3.16
				Manicaland	55	9.18	0.51
				Midlands	55	9.18	0.51
		6129	**57.18**				
West Africa	Benin (2009)	150	1.40	Cotonou	129	86.00	1.20
				Others	21	14.00	0.20
	Burkina Faso (2009)	394	3.68	Bobo-Dioulasso	83	21.07	0.77
				Ouagadougou	311	78.93	2.90
	Gambia (2006)	174	1.62	Banjul	31	17.82	0.29
				KMC	143	82.18	1.33
	Guinea (2006)	223	2.08	Conakry	189	84.75	1.76
				Kindia	34	15.25	0.32
	Guinea-Bissau (2006)	159	1.48	Bissau	159	100.00	1.48
	Liberia (2009)	150	1.40	**Margibi**	15	10.00	0.14
				Montserrado	104	69.33	0.97
				Nimba	31	20.67	0.29
	Mali (2007-2010)	850	7.93	Bamako	581	68.35	5.42
				Mopti	64	7.53	0.60
				Segou	121	14.24	1.13
				Sikasso	84	9.88	0.78
	Niger (2009)	150	1.40	**Maradi**	15	10.00	0.14
				Niamey	135	90.00	1.26
	Senegal (2007)	506	4.72	Dakar	334	66.01	3.12
				Kaolack	48	9.49	0.45
				Saint-Louis	61	12.06	0.57
				Thiès	63	12.45	0.59
	Sierra Leone (2009)	150	1.40	Free Town	98	65.33	0.91
				Kenema	52	34.67	0.49
	Togo (2009)	155	1.45	Lome	155	100.00	1.45
		3061	**28.56**				
Total	**23 countries**	**10718**		**78 cities**	**10718**		

Source: authors' computation based on the standardised World Bank Enterprise Surveys in low-income Sub-Saharan African countries (2006-2013).Cities in bold refer are grouped in our analysis. Interview year is reported between brackets.

Figure 2.1. Percentage of firms and average $INIC_n$ per country



Source: authors' computation based on the standardised World Bank Enterprise Surveys in low-income Sub-Saharan African countries (2006-2013)

Appendix 3

Table 3.1. Summary statistics and definition of variables included in the analysis

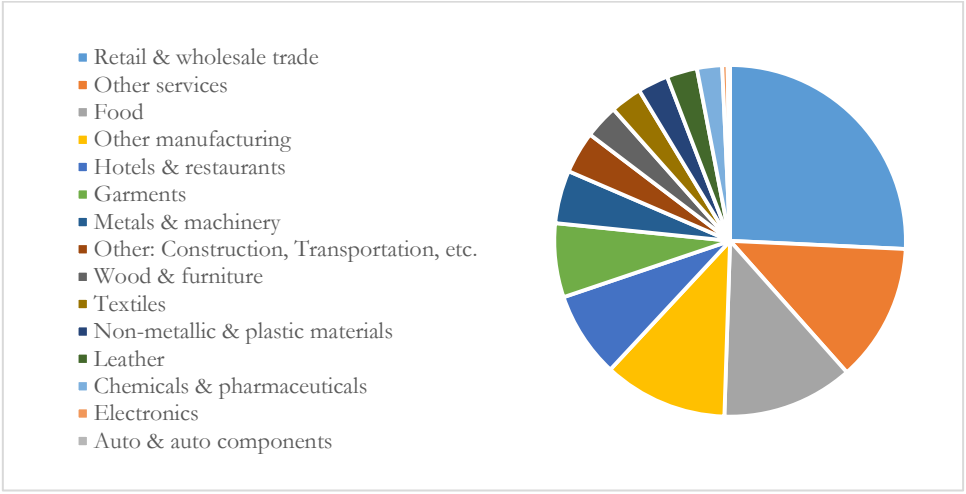
Variable	Definition	Obs.	Mean	Std. Dev.	Min	Max
$last\ fiscal\ year's\ total\ sales\ revenue_i$	Firms' total sales revenues in deflated USD	9672	939175.1	7.32e+07	.0000257	7.15e+09
$last\ fiscal\ year's\ total\ full\ time\ workers_i$	Firms' total last fiscal year full time workers (incl. permanent, and temporary and seasonal workers)	10728	54.26731	251.99	1	15500.5
$prod_i$	Firms' labour productivity	9597	7357.659	433400.8	3.68e-06	4.05e+07
$INIC_n$	City-level indicator of informal competition	10718	.6234	.160	0	1
$PERCEIVE_i$	Dummy variable =1 if the firm perceives informal firms' competition as a binding constraint (moderate, major or very	10521	.56	.496	0	1

	severe); 0 otherwise (minor or no obstacle)					
AGE_i	Firm age (years)=the difference between the interview's date and the date on which the firm began operation (plus one)	10616	15.561	13.81	1	173
$Experience_i$	Years of experience the firm's top manager has in the sector	10599	13.677	9.388	0	70
TAX_i	Dummy variable =1 if the firm perceives tax rates as moderate, major or very severe obstacle; 0 otherwise (minor or no obstacle)	10704	.6207	.485	0	1
COR_i	Dummy variable =1 if the firm perceives corruption as moderate, major or very severe obstacle; 0 otherwise (minor or no obstacle)	10591	.483	.499	0	1
REG_i	Dummy variable =1 if the firm perceives labour regulations as moderate, major or very severe obstacle; 0 otherwise (minor or no obstacle)	10728	.235	.424	0	1
$SOLE_i$	Dummy variable=1 if the firm's status is sole proprietorship, 0 otherwise (publicly listed company, private limited liability company, partnership or limited partnership)	10750	.594	.491	0	1
FI_CERT_i	Dummy variable =1 if firms' annual financial statement is checked and certified; 0 otherwise	10689	.426	.494	0	1
$Quality_i$	Dummy variable =1 if the firm has an internationally-recognized quality certification; 0 otherwise	10413	.16	.366	0	1
$Manufacturing_i$	Dummy variable =1 if firm's sector of activity is manufacturing; 0 if services	10897	.485	.499	0	1
EXP_i	Percentage of direct and indirect exports in firms' total annual sales	10540	5.95	19.894	0	100
$Perceive_i$	Formal firms' perceptions towards illegal competition from informal sector =0 (no obstacle)=26.22% =1 (minor obstacle)=17.77% =2 (moderate obstacle)=17.81% =3 (major obstacle)=19.37%% =4 (very severe obstacle)=18.82%					
$SIZE_i$	Firms' size (reference= small firms) =0 (small, 5-19 employees)=63.55%					

	=1 (medium, 20-99 employees)=26.25% =2 (large, +100 employees)=10.2%
$Working\_capital_i$	Source of firms' working capital (reference= internal funds) =0 (more than 50% is financed by internal earnings)=83.11% =1 (more than 50% is financed by banks)=6.17% =2 (more than 50% is financed by non-bank institutions)=1.13% =3 (more than 50% is financed on supplier credits/customer advance)=7.48% =4 (more than 50% is financed by others (moneylender, family, friends & relatives))=2.11%
$Ownership_i$	Ownership status (reference= private domestic) =0 (more than 50% is owned by private domestic individuals, companies or organisation)=85.85% =1 (more than 50% is owned by private foreign individuals, companies or organisation)=13.68% =2 (more than 50% is owned by government/state)=0.47%

Source: authors' computation based on the standardised World Bank Enterprise Surveys in low-income Sub-Saharan African countries (2006-2013)

Figure 3.1. Formal firms' industries



Source: authors' computation based on the standardised World Bank Enterprise Surveys in low-income Sub-Saharan African countries (2006-2013)

Appendix 4

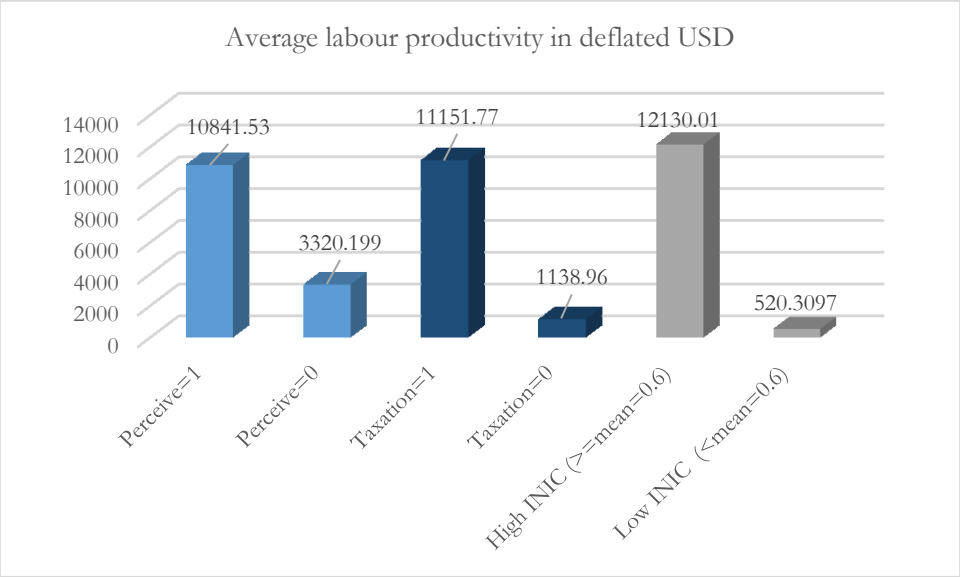
Table 4.1. General differences between formal firms perceiving informal competition as a binding constraint and those who do not

	$PERCEIVE_i$=1 (n = 5,892)	$PERCEIVE_i$=0 (n = 4629)
Small firms	66.18%	60%
Medium firms	25.65%	27.06%
Large firms	8.17%	12.93%
Sole proprietorship	60.96%	57.74%
Working capital: banks	6.49%	6%
Working capital: internal earnings	82.50%	83.28%
Electricity is a binding constraint	74.52%	69%
Corruption is a binding constraint	57.93%	37.53%
Taxation is a binding constraint	69.56%	54.34%
Labour regulations is a binding constraint	30.49%	15.6%
Manufacturing sector	49.69%	48.33%
Service sector	50.31%	51.67%

Source: authors' computation based on the standardised World Bank Enterprise Surveys in low-income Sub-Saharan African countries (2006-2013)

Appendix 5

Figure 5.1. Informal firms' competition, Taxation, $INIC_n$ and Formal firms' labour productivity



Source: authors' computation based on the standardised World Bank Enterprise Surveys in low-income Sub-Saharan African countries (2006-2013)

Appendix 6

Table 6.1. The effect of informal firms' competition on formal firms' productivity - Robustness checks

	Baseline regression (table 4 - column 1)	Excluding countries with conflicts or natural resources	Excluding outliers in labour productivity	With TFP	With capital-population control
	(1)	(2)	(3)	(4)	(5)
$INIC_n$	0.499***	1.185***	0.438***	2.063**	1.454***
	(0.182)	(0.243)	(0.166)	(0.878)	(0.122)
$SIZE\_medium_i$ (ref. small firms)	0.0705	0.0683	0.0719*	0.873***	0.0675
	(0.0493)	(0.0636)	(0.0414)	(0.0831)	(0.0496)
$SIZE\_large_i$ (ref. small firms)	0.0283	-0.0792	0.115*	1.767***	0.103
	(0.0846)	(0.0876)	(0.0656)	(0.117)	(0.0888)
AGE_i	0.00534***	0.00328*	0.00310**	0.0158	0.0134***
	(0.00158)	(0.00181)	(0.00143)	(0.00983)	(0.00168)
$Experience_i$	6.49e-06	0.00211	0.00214	0.00575	0.00180
	(0.00238)	(0.00276)	(0.00187)	(0.00529)	(0.00232)
$SOLE_i$	-0.318***	-0.390***	-0.355***	-0.230	-0.453***
	(0.0437)	(0.0591)	(0.0348)	(0.208)	(0.0478)
EXP_i	0.00131	-0.000803	0.000781	-0.00749**	-0.00265**
	(0.00110)	(0.00137)	(0.000958)	(0.00306)	(0.00111)
FI_CERT_i	0.572***	0.513***	0.517***	0.436***	0.568***
	(0.0438)	(0.0521)	(0.0361)	(0.107)	(0.0429)
$Quality_i$	0.472***	0.339***	0.401***	0.422***	0.424***
	(0.0587)	(0.0778)	(0.0476)	(0.153)	(0.0566)
$Ownership_i$ (ref. private domestic)					
$Ow\_private\_foreign_i$	0.485***	0.385***	0.386***	0.0757	0.330***
	(0.0610)	(0.0781)	(0.0543)	(0.226)	(0.0613)
Ow_gov_i	-0.324	-0.0991	-0.155	0.0659	-0.299

	(0.319)	(0.372)	(0.275)	(0.440)	(0.293)
$Capital\_pop_i$ (ref. capital city)					
$Over\_1million_i$					-0.386***
					(0.0495)
$250{,}000 - 1million_i$					-0.445***
					(0.0548)
$50{,}000 - 250{,}000_i$					-0.199***
					(0.0465)
$Less\ than\ 50{,}000_i$					-0.164
					(0.574)
Constant	3.347***	2.806***	3.610***	-2.239***	2.729***
	(0.264)	(0.329)	(0.231)	(0.623)	(0.137)
Observations	8,487	4,237	8,247	3,056	8,487
R-squared	0.274	0.286	0.298	0.368	0.186
Year dummies	Yes	Yes	Yes	No	No
Industry dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	No	No
Level of se cluster	-	-	-	Country	-

In columns (1, 2, 3 & 5), the dependent variable is the log of annual labour productivity of formal firms in deflated USD. In column 4, the dependent variable is total annual sales in deflated USD. In column (2), we exclude 9 countries with conflicts or /& wars or/& natural resources (Burundi, Central African Republic, Chad, Democratic Republic of Congo, Mali, Niger, Uganda, Tanzania and Guinea). In column (3), we exclude productivity outliers (firms with labour productivity more than three standard deviations away from the mean value. In total 285 firms were excluded). In column (4), we compute total factor productivity using a standard Cobb Douglass production function where we regress the logarithm of total annual sales in deflated USD on the logarithm of firms' labour, material, and capital costs. In column (5), we control for the size of the city in which the firm is located by including the variable $Capital\_pop_i$ which equals zero if it's the capital city, one if it's a city with population over 1 million, two if it's a city with population 250 000 to 1 million, three if it's a city with population 50 000 to 250 000 and four if it's a city with population less than 50 000. List of explanatory variables is provided in table 3.1 (appendix 3). We control for firm's interview year, industry and country. Non-parametric robust bootstrapped standard errors (500 replications) are reported in brackets in all columns. Robust standard errors are clustered at the country level and are reported in brackets in column (4). *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

Appendix 7

Table 7.1. Informal competition, taxation and formal firms' productivity - Correlation matrix

	$prod_i$	$PERCEIVE_{ns}$	$PERCEIVE_i$	TAX_{ns}	TAX_i
$prod_i$	1				
$PERCEIVE_{ns}$	0.0121	1			
$PERCEIVE_i$	0.0085	0.4134***	1		
TAX_{ns}	0.0071	0.2967***	0.1295***	1	
TAX_i	0.0111	0.1261***	0.1683***	0.4228***	1

Source: authors' computation based on the standardised World Bank Enterprise Surveys in low-income Sub-Saharan African countries (2006-2013). *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

General conclusion

Starting from being completely neglected, the informal sector is becoming today the norm in developing African countries rather than an exception. This thesis shades the light on the necessity of recognizing the importance of the informal sector in Africa. We contribute to the literature by exploring answers to the prevailing controversy arisen from the growth of the informal sector despite its negative impacts. Hence, following the recent literature on the informal sector entrepreneurship (Chen, 2012; Godfrey, 2015; Williams at *al.*, 2016; Amor-s et *al.*, 2016), this thesis goes beyond the widespread negative impacts of the informal sector by looking at the interaction between the formal and the informal sectors. Our findings are based on multiple firm-level empirical approaches that focus on the Egyptian economy and low-income countries in Sub-Saharan Africa. This group of countries forms a very interesting example of countries that report, simultaneously, a sizeable informal sector, weak business environment, and recent economic catch-up.

Our empirical model starts by rewiring the impacts of informality on the productivity of micro and small enterprises (M/SEs), which represent the largest part of the informal sector and the core of the economic system in Egypt. Our results confirm that operating informally reduces significantly the productivity of M/SEs in Egypt. Yet, we show that M/SEs' willingness to register largely depends on several factors among which M/SEs access to finance is the most important. Therefore, as advocated by Djankov et *al.* (2010) and Benjamin et *al.* (2012), our results provide evidence that the growth of the informal sector in Egypt is mainly due to two factors; the government incapacity to provide the private sector with basic goods and services, and the poor quality of the business environment. Based on this evidence and results, the informal sector should disappear with economic development. However, this was never the case in Egypt or in other developing countries. That's why in order to explain the expansion and the strong persistence of the informal sector, we investigate the channel through which the informal sector could bring positive outcomes to the economy.

Therefore, we emphasize the interactions between the formal and the informal sectors under a different angle that accounts for market competition. As informal competition is better felt on a local-level (as suggested by Gonzalez & Lamanna, 2007), we start our analysis by constructing a new local indicator of informal firms' competition in Egypt and in low-income Sub-Saharan African countries. Reported scores of this indicator show to what extent informal firms can exert

a strong competition pressure on formal firms located in the same region (governorates in Egypt or cities in Sub Saharan Africa).

Our empirical estimation of the effect of the competition stemmed from informal firms on the productivity of formal ones reports a positive and significant effect. This positive effect remains valid to the adoption of different specifications (ordinary least square, instrumental variables) and different samples (Egypt and low-income Sub Saharan countries). However, we show that the underlined positive effect is segmented by formal firms' size, sector of activity and current labour regulations. Larger firms operating in the service sector and facing less sever labour regulations are more susceptible to boost their productivity by creating economy of scales and by better allocating their resources.

We continue our empirical estimations by identifying the main channel through which the underlined positive effect holds. Based on a difference in difference model, we show that taxation plays a major role in determining the relationship between formal and informal enterprises. Our results confirm that the reduction of tax rates and the alleviation of tax procedures in Egypt increase significantly the productivity of formal firms located in governorates with moderate to high intensity of informal competition.

Moreover, based on Fisman & Svensson (2007) instrumental variable approach, we show that the direct effect of taxation on formal firms' productivity implies an indirect effect of informal competition on formal firms' productivity in low-income countries of Sub-Saharan Africa. The higher is the taxation rate, the bigger is the cost differential between formal and informal firms, and the stronger is informal firms' capacity to compete and to take market shares. By consequence, formal firms are motivated to boost productivity by adopting more efficient internal organisation techniques and by better allocating resources, enabling them to regain their market shares.

To sum up, our findings contribute to the literature in different ways. First, our results show that even though informal firms are less productive than formal ones (chapter 1), their interaction with the formal sector can bring positive outcomes to the economy (chapter 2 and 3). Informal firms act as a catalyst of productivity for formal firms by inducing these last to adopt more efficient internal organization techniques and to better exploit their resources. Second, our findings complement the recent literature underlining the informal sector's competitiveness and entrepreneurial capacity (Jütting (2009), Chen (2012), Godfrey (2015), Williams at *al.* (2016), Amor-s et *al.* (2016) and others). We also provide evidence that the positive effects of the informal sector hold under certain conditions that account for the quality of the business and regulatory

environments. That's why the main policy implication that we could derive is the necessity of integrating the informal sector into the economy as a dynamic efficient sector rather than a threat.

The integration of the informal sector must be based on two main assumptions. First, sizeable informal sectors in developing countries can coexist with high productivity growth in the private sector. Second, economic growth is not necessarily encouraging the transition to the formal sector (ILO, 2014). Therefore, governments need to be aware that the forced eradication of the informal sector is not an efficient solution. What is mostly needed is the creation of a sustainable environment based on a strong private sector in which M/SEs and informal firms grow alongside with formal larger firms.

In order to reach this objective, the informal sector must be prepared in advance to integrate the formal sector. Therefore, we underline the necessity of an upstream intervention from the governments in developing countries to induce the formalization process by focusing on the following areas. First, governments should ensure the provision of basic goods and services in terms of easier access to sound infrastructure, to training and modern technology (World Bank, 2013). Most importantly, the government should provide informal firms an easier access to source of funding based on micro-credits with feasible collaterals, especially for women entrepreneurs (USAID, 2009). It should also target the alleviation of the costs and procedures related to taxation and regulations. Second, the improvement of the legal and regulatory environment is required to ensure the effective enforcement of the law and the protection of property rights. We also recommend the establishment of a separate law for informal firms that distinguishes between informal micro, small and medium enterprises form one hand, and larger informal firms form the other hand, and that devotes more attention to women entrepreneurs. In addition, transparency and transfer of information is indispensable in order to attract informal firms willing to formalize but fearing the penalties associated with unreported payments.

Even though recently lots of African economies appear among the best improvers in Doing Business (such as Benin, Togo, Côte d'Ivoire, Senegal and the Democratic Republic of Congo), much progress is still needed (IFC, 2015). The recent political instability of most of African countries shows that the remarkable economic growth experienced since 2000s was not inclusive. Poverty, inequality and unemployment have become more pronounced everywhere. That's why, the creation of a more friendly business environment for all firms that encourages local and foreign investment should be at the top of the new development Agenda of African economies. Especially

that after decencies, we are unfortunately getting back to the same recommendations given by De Soto in 1990 concerning states responsibility towards the private sector and redistribution.

> *"The way law stays alive is by remaining in touch with social contracts pieced together among real people on the ground."* (De Soto, 1990, p. 112)

Abstract

Despite the impressive economic growth of African economies since 2000s, the actual context is threatening the sustainable development of the private sector. Large institutional imperfections and poor business environment are hindering the development of firms and are paving the way for a more persistent informal sector. This thesis reopens the controversial debate about the informal sector by looking at its entrepreneurial capacity rather than its threats. In order to understand the strong persistence of this sector despite its confirmed negative impacts, we investigate the extent to which the relationship between formal and informal firms, through market competition, could affect the Egyptian economy. We find that more intense competition stemming from informal firms can drive formal firms to become more productive. We also extend our analysis to Sub-Saharan African countries by underlining the effect of taxation and regulation on the strength of competition between formal and informal firms. Our findings call on the importance of introducing the informal sector in undertaken policies that target the reform of taxation and regulations in Africa. These policies should also target the firms' access to source of finance, infrastructure and trainings as effective tools inducing the formalization process and fostering economic growth. Therefore, this thesis provides evidence on the importance of revisiting the impacts of the informal sector in developing countries by looking at it as a driver of economic growth rather than a threat.

Keywords Formal and informal firms, Micro and small enterprises, Tax formalities, Informal competition, Firms' productivity, Taxation, Regulations, Firms' constraints, Policy reforms, Egypt, Sub-Saharan Africa.

Résumé

Depuis les années 2000, les économies du continent africain ont fait preuve de remarquable croissance. Toutefois, le contexte actuel met en péril le développement durable du secteur privé. Les imperfections liées au système institutionnel et à l'environnement commercial entravent l'évolution stable des entreprises et ouvrent la voie à la croissance d'un secteur informel très persistant. Cette thèse ouvre à nouveau le débat polémique sur le secteur informel en soulignant la capacité entrepreneuriale de ce secteur plutôt que les menaces qu'il représente. Afin de comprendre la forte persistance de l'informalité en dépit de ses impacts négatifs, nous testons à quel point la concurrence entre firmes formelles et informelles pourrait affecter l'économie égyptienne. Nous constatons qu'une concurrence plus intense incite les entreprises formelles à devenir plus productives. Nous étendons également notre analyse aux pays d'Afrique subsaharienne en soulignant l'effet stimulateur de la taxation et de la réglementation sur la puissance de la concurrence entre les entreprises formelles et informelles. Nos résultats font appel à l'introduction du secteur informel dans les politiques publiques visant la réforme de la fiscalité et de la réglementation en Afrique. Ces politiques devraient également viser l'accès des entreprises aux sources de financement, d'infrastructure et de formations comme outils principaux induisant le processus de formalisation et favorisant la croissance économique. Cette thèse souligne l'importance de repenser les effets du secteur informel dans les pays en développement, tout en le considérant comme un stimulateur de croissance économique plutôt qu'une menace.

Mots clés Firmes formelles et informelles, Micro et petites entreprises, Concurrence informelle, Productivité des firmes, fiscalité, régulations, contraintes des firmes, réforme des politiques publiques, Égypte, Afrique Subsaharienne.