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Cross-Country Comparative Analysis of Enterprise Productivity in MENA Region: An Empirical Assessment[1]

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Contents

Abstract

This paper analysis the determinants of productivity for SMEs for a select group of countries; the countries were chosen from a wide spectrum of development levels. Belgium, Poland, and Malta are from the "North" and Egypt, Morocco, and occupied Palestinian territory (oPt) are developing countries from "south". The analysis of TFP shows that differences in productivity between SMEs and large firms depend on industry, and country. Indeed, whenever such differences exist, SMEs tend to be less productive than larger firms within the same industry. Furthermore, it also seems that differences in productivity also depend on the country's characteristics. Further analysis showed that productivity differences depend on both the industry and the country. It is evident that SMEs in the South tend to exhibit lower levels of productivity irrespective of the industry, whereas in the North discrepancies in productivity can be either positive or negative depending on the industry. The analysis demonstrate that the following variables are significant in explaining productivity: the age of the firm, the share of exports in a firm's output, the intensity of competition within an industry and the technological intensity within an industry. The paper concludes with recommendations of competition and capital access enhancement policies.

Executive Summary

With Small and Medium Size Enterprises (SMEs) amounting to a high percentage of the total enterprises, these significantly contribute towards the economic development of countries by being a driver of innovation. However, SMEs are facing increased competition from new markets and in order to survive these have to improve their competitiveness, mainly by enhancing productivity.

Over the years empirical literature has investigated the linkages between productivity and the different contributors to productivity. In this regard, literature splits these determinants into two groups. The first group constitutes determinants on which the firm has control. According to literature, a firm can increase productivity through restructuring and adopting best practices, and investing in training and information technology. The second group constitutes determinants which are beyond the firm's control and these factors relate to the environment in which the firm operates, including competition and regulation.

An analysis of productivity across the comparator countries shows that the productivity of SMEs in Palestine is low. Egypt like most MENA countries has low levels of productivity which has been attributed to the adverse investment climate. Different studies conducted in Morocco suggest that, training programs contribute positively towards labor productivity in subsequent years (Sekkat, 2011) sectoral level policies (such as the upgrading of technology within the manufacturing industry) are more effective at enhancing productivity (Chemingui, 2005); increasing market demand attracts firms to the market and that in periods of economic downturn the surviving firms experience enhanced productivity (Achy and Sekkat, 2010). In Belgium the main contributor towards increased productivity was capital deepening (Biatour and Kegels, 2008).

Using a Cobb-Douglas production function, labor productivity and Total Factor Productivity (TFP) according to manufacturing activity and firm size were computed. The analysis shows that Belgium has the highest productivity levels in almost all the activities considered. However, when focusing on TFP, the MENA countries exhibit larger figures. The average TFP is highest in the case of Egypt. The productivity of larger firms compared to that of smaller firms is higher in the case of Morocco and Egypt.

An econometric analysis was carried out which showed that there are difference between the labor productivity of SMEs and larger firms. It is also evident that labor productivity differences between smaller and larger firms depend on the industry. Indeed, whenever such differences exist, SMEs tend to be less productive than larger firms within the same industry. Furthermore, it also seems that differences in productivity also depend on the country's characteristics. Further analysis showed that productivity differences depend on both the industry and the country. It is evident that SMEs in the South tend to exhibit lower levels of productivity irrespective of the industry, whereas in the North discrepancies in productivity can be either positive or negative depending on the industry. From the analysis carried out, it seems that the main determinants of productivity are: the age of the firm (morocco only), the share of exports in a firm's output, the intensity of competition within an industry and the technological intensity within an industry.

From the above results, a number of recommendations can be put forward in order to enhance SMEs productivity. Firstly, due to the contribution of competition towards productivity, competition policy should be enforced. Secondly, reforms should be implemented to make it easier for SMEs to access capital. Thirdly, effective export strategies should be implemented.

1. Introduction

While SMEs were traditionally seen as crucial for employment and poverty reduction, it is increasingly recognized that they can be an important driver of R&D and growth. With fast evolving international markets, technological change and sometimes the need of customized goods and services, the flexibility of SMEs is an asset (Hollenstein, 2005 and Veugelers, 2008).

Since the eighties, the internationalization of SME has strongly accelerated (UNCTAD, 1993; OECD, 1997). Although exporting is still the most frequent type of international activity, SMEs become more often directly involved at foreign locations through activities in distribution, production, R&D, etc. Accordingly, research interest shifted towards this more recent phenomenon.

In many developed countries, there is a high correlation between the intensity of innovation in SMEs and innovation in large firms, suggesting that the importance of a country's innovative potential is independent of the size of firms, and that there are complementarities between innovative large and small firms. However, the pioneering SMEs are often young start-up companies, which can be more inclined to introduce radical innovations. The reason is that they do not have to be concerned with safeguarding incumbent profits, or restructuring existing technology profiles of the company. For these reasons, developed and developing countries put the support to SMEs and especially innovating ones among the top priorities of their industrial policy (Buigues and Sekkat, 2009 and Lee and Chew-Ging, 2007).

The increasing openness of many developing countries is putting firms in the face of intense competition. To survive, they must improve their competitiveness in both domestic and foreign markets. One way of improving firm competitiveness is increasing productivity. The general objective of this paper is to study the status of productivity in SMEs of selected European and Southern-Mediterranean countries and to suggest recommendations for its improvement.

More precisely, the research will examine whether the difference in productivity of SMEs and big firms is higher or lower in the South than in the North of the Mediterranean. Moreover, the comparison will be conducted both at the industry and at the country levels. Finally, the study will also seek to identify the major determinants of productivity for SMEs in the Mediterranean. The following specific issues will be addressed:

- Assess labor productivity and TFP in the selected countries
- Investigate whether SMEs' productivity is lower than the one of big firms in the selected countries
- Investigate whether SMEs' productivity is lower than the one of similar firms in the North
- Analyze the factors explaining productivity in Southern-Mediterranean countries.
- Provide policy recommendations

The analysis focuses on three Southern Mediterranean (Egypt[3], Morocco and Palestine) and three Northern (Belgium, Malta and Poland) countries using firm level data for two years (2004 and 2007) which resulted in a pooled sample of 15,490 observations. The countries were chosen to reflect a large dispersion of income, development, and infrastructural levels. Although firm level data in manufacturing is the unit of analysis used in this research; the structure of the selected economies varies widely. This will help highlight the robustness (or lack of) of the relationships. The choice of the years is imposed by data considerations. The rest of the paper is organized as follows. The next section provides a brief review of the literature on the productivity of SMEs. Section three explains and discusses the methodology that will be used to compute labor productivity, TFP and investigate their determinants. Section four presents a comparative analysis

[3] It was initially envisaged that Jordan will be considered in place of Egypt, however, data considerations necessitated this change.

of firms' productivity by size, industry sector and country. Section 5 deals with the econometric analysis addressing the above specific objectives. Section six provides the conclusions.

2. The Literature

Productivity refers to how efficient a firm manages to convert inputs into outputs. At the micro level, it is commonly acknowledged that firms with higher levels of productivity are more likely to survive than the less efficient ones. Less efficient firms are forced to leave the market and the resources are then reallocated among the higher productivity firms.

Syverson (2011)[4] provides an overview of the empirical literature on productivity which has been linked with different aspects related to technology, demand and market structure, including competition, sunk costs, market rivalry and technological spill overs. ***Labor economists*** have also investigated the contribution of human capital to productivity differences, including the effects of incentive pay, human resources' practices, managerial talent, organizational form and relationships among co-workers. There are cases where two distinct producers with the same technology have two different labor productivity levels. This results because one of the producers uses capital more intensively than the other. Thus, researchers often use the term Total Factor Productivity (TFP) which relates to productivity that is not directly attributable to the use of factor inputs. Usually, producers with high levels of TFP produce larger amounts of output with the same amounts of inputs.

One of the studies that addressed low productivity in LDC's is Bloom et al (2010), Using an international data base (ORBIS), they find that Moroccan and Polish firms have lower levels of labor productivity when compared with the developed countries. Bloom et al (2010) ***postulate that the main reasons for the low productivity in LDC's is linked to the following: poor management especially in large firms, financial constraints, and decision making, where owners make all major management decisions because of distrust in management.***

2.1 Determinants of Productivity

The detreminants of productivity can be classified into two groups; one of which the firm has control over, and the second is beyond firm control.

The first group

Managerial talent and management practices - Bloom and Van Reenen (2007), state that although there are managerial practices which improve productivity, organizations may still not adopt these practices for reasons which have to do with the costs of implementing them, shirking, and quality of workers.

Information Technology - Studies using firm-level data, found out that IT contributes towards productivity enhancement. Sobhani (2008) stated that, if appropriately used, IT investment increases productivity in three ways:

- IT investment by firms increases the volume of capital used per worker (capital deepening)
- Accelerated growth in IT ***producing firms*** leads to growth in total factor productivity.
- Accelerated growth in IT ***using firms*** leads to growth in total factor productivity.

Training - Human capital possesses knowledge, experience and skills which are an asset to the firm as these enhance the firm's performance, competitiveness, innovation, efficiency and effectiveness (Becker, 1994). Black and Lynch (1996) used a Cobb-Douglas production function to estimate the impact of training on production. They used data from a sample of 2,945 firms on sales, receipts, capital stock, and materials. The results obtained showed that current training lowers current productivity[5], but past training increases current productivity. The reason for that is that training operates with a time lag; i.e., it takes time for new skills to be implemented. Sekkat (2011) also found positive impact of training on productivity using Moroccan data.

[4] This review draws heavily on Syverson 2011, however, other literature was incorporated whenever necessary.
[5] The sign of current training was found to be negative, however, insignificant.

Firm structure - Past literature has investigated the relationship between the firms' size and structure, and productivity. Nguyen and Reznek (1991, 1993) showed that size is not a prerequisite for efficient production. Indeed, Acs and Audretsch (1990) showed that smaller firms outperform larger firms when it comes to implementing innovative practices, even though the majority of the research and development expenditure is undertaken by larger firms.

The second group

There are particular factors that characterize the environment in which firms operate which cannot be controlled by the individual firms and these are very much linked to government policy. The main environmental factors are spillovers, competition, regulation, and input markets.

Spillovers - Producer practices such as production processes and operations can have a spillover effect on the productivity of other firms (Syverson, 2011). This spillover effect can take the form of knowledge transfer which is not restricted to any particular input market or geographical area. Moretti (2004) found that spillovers are stronger among plants that are close in terms of geography and technology utilized. It is difficult for a firm to imitate exactly the practices of its rival and this is supported by the fact that productivity differences persist among different firms. These differences exist due to the differing efficiency levels of the firms as they do not have the capacity and capability of copying the practices of their rivals. Spillovers have also been studied in a cross country context; Keller and Yeaple (2009) provide evidence of foreign direct investment on productivity convergence. Ultimately, spillover enhancing policies may do harm in the long run if firms find it difficult to internalize the benefits of their R&D.

Competition - Competition can drive productivity by:

- ✧ Putting downward pressure on costs
- ✧ Forcing firms to focus more on meeting customer needs
- ✧ Allocating resources more efficiently between firms
- ✧ Incentivizing innovation (Office of Fair Trade, 2007).

Ospina and Schiffbauer (2006) found "a positive and robust causal relationship" between measures of competition and measures of productivity[6]. There are three main channels through which competition can drive productivity:

- ✧ **Within firm effects** – In a market with perfect competition, inefficient firms are forced to leave the market in the long run (Office of Fair Trade, 2007). Thus, managers review their operations to ensure an effective production process and the effective utilization of resources.
- ✧ **Between firm effects** – Studies have shown that there are differences in productivity among firms which leads to market sorting (Office of Fair Trade, 2007). When driven by competition, market sorting[7] can be an important driver of productivity. Market sorting can take place through a Darwinian mechanism. Through this mechanism, efficient firms are rewarded with higher profits and market shares. This takes place at the expense of less efficient firms which are then forced to leave the market and replaced by new firms. As firms expand and the less efficient firms become smaller and fewer, there are efficiency gains experienced by the industry at an aggregate level.
- ✧ **Product and process innovation** – Innovation incorporates both technological improvements of process, which lead to a reduction in costs, and the creation of new products which make existing products outdated (Office of Fair Trade, 2007). Ospina and Schiffbauer (2006) find that product market reforms lead to more competition and account for an increase in productivity. Having said that, some argue that technology adoption is is not completely exogenous, for example, Acemoglu, Antras, and Helpman (2007) provide an argument that incomplete contracts lead to the adoption of less advanced technologies. Zeira (1998) argues it is differences in capial labor ratios that explain differences in technology adoption. Another

[6] A more detailed account of mechanisms by which competition can affect productivity can be found in Syverson (2011). Sekkat (2009) provides an overview and evidence on the relationship between competition and productivity, he also finds a positive relation.

[7] This refers to improvements in productivity resulting from reallocation of resources between firms due to competition.

possible factor for explaining the adoption of technology is skill supply as explained by Acemoglu and Zilibotti (2001).

Regulation - Studies have investigated the impacts of regulation on productivity at a macroeconomic level. Nicoletti and Scarpetta (2003) showed that there is a positive relationship between product market reforms and total factor productivity via a reduction in administrative burdens. Tight product market regulation has a negative effect on total factor productivity growth as it slows down the technological change. Privatization has a strong statistically significant effect on productivity, but negative effect of barriers to entrepreneurship which is not statistically significant. Loayza et al (2005) found that there is a significant negative relationship between regulation and economic growth. However, such negative relationship weakens as there is an improvement in the quality of institutions. Arpaia et al (2007) estimated that a 25% decrease in administrative burdens would lead to a 0.9% increase in the EU-15 GDP by the year 2025.

Regulations can create barriers to entry, for example, through compliance costs or licensing. Griffith and Harrison (2004) showed that over the period between 1980 and 2000, countries with low levels of rents[8] experienced higher growth rates of productivity, as well as improved innovation and investment. Regulations can also restrict labor markets adjustments. Indeed, Scarpetta and Tressel (2002) showed that strict employment protection legislation increases the costs of hiring and firing employees. Hence, it is more difficult for labor to adjust to technical changes and this reduces the firms' incentives to innovate, and thus limit productivity growth. Despite imposing compliance forms, regulations can also enable productivity growth by promoting competition and facilitating investment and innovation. An appropriate corporate governance framework is considered as a pre-condition for enterprise and investment, and also an important factor of firm performance. Maher and Anderson (1999) provide an overview of the links governing the relation between corporate governance and corporate as well as economic performance. They discuss the shareholder model and the stakeholder models of corporate governance; the agency problem arising from the separation of ownership and control is reduced by concentrated ownership. On the other hand, dispersed ownership brings in the liquidity but not necessarily long-term relations needed for investment. The role of the regulator is strike a balance between these conflicting objectives. Their review of the empirical literature shows that governance does affect performance and thus there is a concern for industrial competitiveness. Many US and UK based studies find that owner-controlled firms outperform manager-conrolled firms (Guglar (1999)). On the other hand, German and French based studies, Thonet and Poensgen (1979, German), Jacquemin and Ghellinck (1980, French), find that manager controlled firms outperform owner-controlled firms from a profit perspective; however, they achieve faster growth. In conclusion, and due to the dynamic nature of governance, countries are unique due to regulatory frameworks and cultural norms. Thus those experiences are not transferable from one country to another.

Flexible input markets - The easier it is to attract more inputs, the faster and the more smoothly the reallocation mechanism to increase supply (Syverson, 2011). The institutional features of the input markets such as the unions and the financial sector influence the flexibility of the input markets. They would make the input market more flexible if the institutions are efficient, address asymmetric information, and work towards enhancing efficiency. Bartelsman, Haltiwanger, and Scarpetta (2009) carried out a study on resource allocation across countries. Results show that markets which are operating efficiently should reallocate output to more productive plants resulting in a positive relationship between output share and productivity.

2.2 Productivity of SME's in Comparator Countries

The literature on comparator countries covered by this study varies in coverage and method based on data availability, which in some instances makes it difficult to bench mark the figures against those published in the literature. In the Palestinian case, the Palestine Central Bureau of Statistics has produced industrial survey data for the period 1996-2009, which would make it a rich data set. However, very few specialized studies utilized this data set. One of those studies (UNCTAD 2004)

[8] Measured by the ratio of value added to labor and capital cost.

uses data from a PCBS/UNCTAD survey of 3735 firms covering the period 2000 – 2002. Although the study is quite descriptive in nature, it is very informative about the profile of firms and draws conclusions about firm productivity. The findings of this study may have been sensitive to the time period in which it was covered; The years 2000-2002 witnessed the second Intifada in which the Palestinian economy was completely paralyzed. The main findings for1999 with regard to productivity is that for small enterprises (5-19 employees), the gross value added per worker is $9,900 while it is $12,400 for medium sized enterprises (a workforce of 20-50). This implies that medium sized firms operate at a 20% efficiency advantage compared to smaller sized firms. According to the kind of activity the firm operates within, the VA/worker is always lower for smaller size firms except for construction where smaller firms productivity is 20% higher; however, in other manufacturing activities, both types of firms are roughly at parity. Small firms in mining and quarrying has the lowest productivity ratio (37%) when compared to medium sized enterprises; this may be attributed to the capital intensity in stone cutting facilities which uses large machines that raise labor productivity markedly.

Investigation of the capital – labor ratio for firms across different activities in 1999 shows that mining and quarrying has the highest ratio ($18,839) and the lowest is for the remaining manufacture of wearing apparel ($ 1603). For all firms the average is $8331. The capital intensity (K/L) measure is expected to raise VA/worker, the study shows positive correlation for firms in the various activities. However, the study also reveals that a very large capital/output gap exists; on average, the values of firms' assets are 35% of firms' output in 1999. This indicates an excess capacity of 65% a year in which the Palestinian economy performed well.

Makhool and Qattan (2006) and Kawasmi and while (2010) provide an overview of SME's in the oPt, their employment, problems and potential. Both studies reveal low productivity of SME's. Naquib (2006) calculated TFP for Palestinian firms between 1996 – 2004 using growth accounting; his main conclusion is that the wage-productivity gap has narrowed over this period. Real wage growth was negative and productivity slightly improved.

A review (Kinda et al (2010A)) of Egyptian firm performance for 2004 and 2006, using World Bank enterprise survey, shows that Egypt's technical efficiency is at best 32% (non-metal and plastic materials) and at worst 14% (chemical and pharmaceutical products)[9]. This study links Egypt's (and most MENA countries) low productivity to the deteriorating investment climate. Morocco is shown to perform better than many MENA countries. In a different article, Kinda et al (2010B) show that Egypt and other MENA countries perform well below average using firm-level data. In particular, labor productivity and TFP measures show that Egypt ranks very low compared to other countries. The average product of labor is anywhere from 10% to 20% of the best performing firms; while unit labor costs are in the 27% - 51% of the best performing firms[10]. Another review on SME's in the Egyptian's informal sector can be found in Abedel-Fadil (2000); The study classifies enterprises into formal and informal based on size, registration, tax filing, health insurance and invested capital. It concludes that more than 45% of the work force is in the informal sector; the majority of those are employed in the service sector.

The studies of Kinda et al (2010A) and (2010B) show that Morocco performs well relative to the best performing countries of Brazil and South Africa. This implies that the investment climate and unit labor costs and human capital improve firm productivity in Morocco. Sekkat (2011) studies the effect of training in 1999 for small and large firms in Morocco, on the labor productivity one year later. The paper uses two data sets; the first is from the annual Moroccan census of manufacturing, which was conducted by the Moroccan government. The second data set is a survey of firm analysis and competitiveness, which was conducted in 2000 by the Moroccan government and the World Bank. The firms in the two sets have the same code which makes tracking possible overtime. The methodology utilizes a Cobb-Douglas production function, with endogenous technological progress which is a function of training. The results indicate that

[9] The term Technical Efficiency (TE) is obtained using a translog production function by frontier analysis, the TE coefficient expresses a countries efficiency as a percent of the most productive country/sector. Table 2 of Kinda et al (2010) shows that Egypt ranks very low among a selection of MENA countries.

[10] The authors indicate that comparability across countries is hampered by use of current exchange rates for wages and output.

training programs in 1999 have a significant and positive impact on the labor productivity in subsequent years in small and medium firms (less than 100 workers), and non-significant impact on large firms (more than 100 workers).

Chemingui (2005) analyzed productivity changes in Morocco over the past four decades. The study investigates GDP growth starting with the 1960's onwards. The strongest growth was witnessed in the period from 1960 –early 80's, and declined in the second period (1980s to the early 1990s), and the third (1990s onwards). This report attributes the decline of GDP growth during the successive periods to the decline of capital deepening, and the decline of labor productivity, which declined from 3.8% in the first period to 1.4% in the second and third periods. But the annual growth rate in total factor productivity increased from 0.9% in the first period to 2.1% during the second period, and then decline to 0.1% during the third period. This report claims that policies that target the sectoral level are more efficient; for example, the productivity increase in the manufacturing sector remain competitive in the global economy, and one way to improve productivity in the manufacturing sector is by upgrading its primary technology.

Achy and Sekkat (2010), study the effect of firm entry and exist on the improvement of productivity of Moroccan manufacturing sector; it also investigates the dynamism of the entry-exit process and what institutional factors influence it. The authors conclude that the presence of competitive forces and improvement in market demand positively affect firm entry. They also find that this dynamic process leads to surviving firms restructuring leading to sizeable improvement in productivity.

Although Belgium differs markedly from the rest of countries in this study, it is meant to be used as a bench mark to which other countries are to be compared[11]. Biatour and Kegels (2008), analyzed the main factors that affect economic growth and increasing productivity in Belgium. The study compares the performance of productivity growth for Belgium, the EU, and the US. Since the 1990's US firms showed stronger labor productivity growth (than Belgium and the EU which experienced a decline in labor productivity growth) and productivity growth convergence was achieved in 2005. It is found that the main reason for the slowdown of the Belgium labor productivity growth is a decrease in manufacturing contribution to aggregate labor productivity growth. On the other hand, there was an increase in the contribution of all main industries to aggregate productivity in the US. Over the period 1970 to 2005, the capital deepening in the manufacturing sector is the main contributor of productivity gains in Belgium, while the multi-factor productivity was the main contributor of productivity gains in the EU and in the US.

Hagemejer and Kolasa (2011) use Polish firm level data covering the period 1996-2005 for all medium and large enterprises. They find that internationalized firms are often more capital intensive, larger, and pay higher wages. Their results show that exporters and importers of capital goods are more productive than their domestic counterparts. Internationalized firms have also improved their performance overtime, widening the productivity gap. In studying the relation between competition and productivity, Ospina and Schiffbauer (2006) included Poland as one of the 27 countries covered by the study. Poland was classified as a non-reformer because its Fraser Index "The Ease of Doing Business" did not change by at least 40% between 2001 and 2004. In fact, the change in entry costs rose 22% between 2001 and 2004.

The literature on Malta's firm productivity is virtually non-existent; some literature referring to aggregate firm productivity in manufacturing can shed some light on productivity in Malta. Studies carried out on the productivity of the manufacturing sector in Malta, have focused at the macro level and have compared Malta's performance with that of other countries. The Manufacturing industry in Malta recorded the highest real gross value added in 1995 (Falzon, 2011). Indeed, the contribution of the Manufacturing industry to the gross value addeed decreased from 21.7% in 1995 to 13.2% in 2009. As Figure 1 shows, between 2000 and 2004 there was a decrease of €187.8 million in nominal gross value added. However, following Malta's accession to the European Union (EU), the contribution to the gross value added contributed by the Manufacturing industry recoved by €151.3 million (equivalent to €54.1 million at 1995 prices). This might signify that

[11] At least from the environment within which firms operate, Belgium enjoys better infrastructure, regulatory environment, and business services and access to technology.

indeed deregulation (achieved through Malta's accession to the EU) have resulted in higher productivity of the manufacturing sector (Nicoletti and Scarpetta, 2003). However, a much deeper analysis is required to disaggregate the different environmental factor that might have influenced this trend.

Figure 1: Manufacturing Gross Value Added, Compensation of Employees, Operating Surplus at constant prices

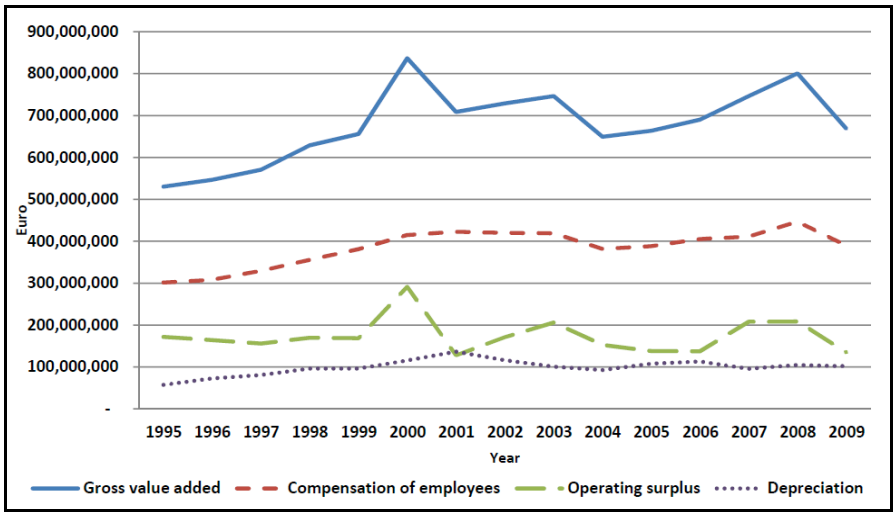
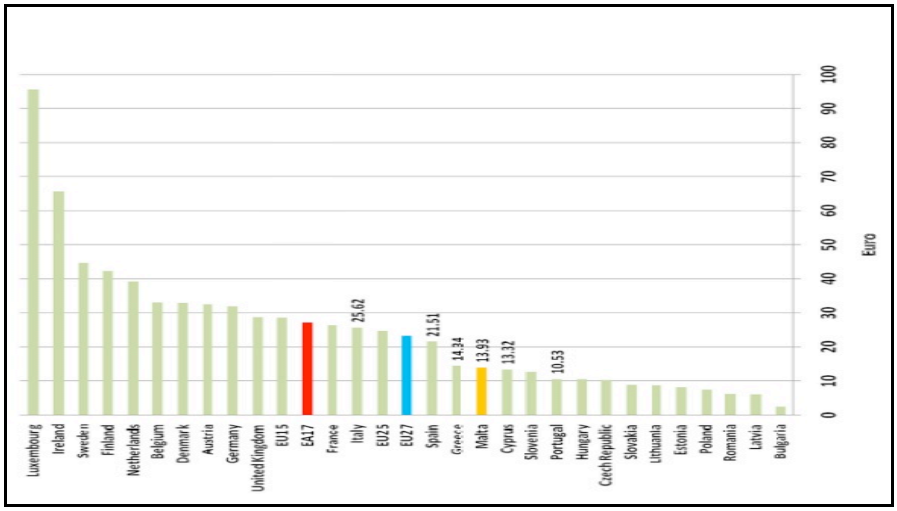


Figure 2: Gross value added per hour worked (2007) – Manufacturing Sector



An analysis of the Gross Value Added (GVA) of the manufacturing industry in Malta with the EU 27 shows that Malta ranks in 15th position with a GVA per hour figure of €13.93 compared to an average of €23.25 for the EU 27 (Falzon, 2011). As Figure 2 above shows, Belgium performs much better than Malta with a GVA per hour higher than €30. However, Malta performs better than Poland which has a GVA per hour below €10. As the same figure shows, Malta performs well compared to the other Mediterranean countries[12].

[12] The European Union (2012) published an article in its Enterprise and Industry Magazine comparing the industrial performance of EU member states throughout the European crisis. EU member states were classified into three classes: Consistent performers (Germany, Denmark, Finland, Sweden, Austria, Ireland, the Netherlands, the United Kingdom, Belgium and France) , uneven performers (Estonia, Slovenia, Spain, Italy, Portugal, Greece, Malta, Cyprus and Luxembourg), and the catching up group (Bulgaria, Romania, the Czech Republic, Poland, Hungary, Slovakia, Latvia and Lithuania). The article postulates that Poland's industry fared well due to export activities, access to finance, and strong local demand; yet the industry requires catching up to do

3. Methodology

We adopt a similar methodology to Sekkat (2011). In an augmented Cobb-Douglas production function with constant return to scale[13]:

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta} M_{it}^{\delta} \quad (1)$$

Where Y_i is output, K_i (capital), L_i (labor) and M_i (intermediate materials) and $\beta = 1 - \alpha - \delta$ for firm i. A_i is the TFP which comprises variations in output which are not attributable to the observable inputs and it is equal to:

$$TFP = A_{it} = \frac{Y_{it}}{K_{it}^{\alpha} L_{it}^{\beta} M_{it}^{\delta}} \quad (2)$$

Given the constant return to scale assumption, labor productivity is given by:

$$LaP = Y_{it} / L_{it} = A_{it} (K_{it} / L_{it})^{\alpha} (M_{it} / L_{it})^{\delta} \quad (3)$$

For empirical implementation, we take into account that the relationship might be affected by a stochastic error and take the logarithm which gives for TFP:

$$\ln TFP = \ln A_{it} + \varepsilon_{it} \quad (4)$$

The stochastic error being on average nil in large sample, TFP is often calculated as the anti-log of the residual of the estimated equation (5) below.

$$y_i = \alpha k_i + \sum_j \beta_j ID_{ji} + \sum_s \lambda_s CD_{si} + \sum_\tau \delta_\tau SD_{si} + \varepsilon_i \quad (5)$$

Where *y_i is the value of output per worker for firm i converted to Euros using the nominal exchange rate*
k_i is capital labor ratio (value of machinery and equipment per worker)
ID_{ji} industry dummy for firm i in industry j
CD_{si} is country dummy firm i in country s
$SD_{\tau i}$ is size dummy for firm i of size τ
ε_i error term

The above equations serve as a basis for most of the empirical analysis in this field. There are different issues that need to be tackled when measuring productivity which are mainly related to measurement and data quality[14]. When it comes to the output measure, the problem that arises is how to measure the different outputs that a company produces. A solution might be to take the value of the outputs (deflated revenues), or physical quantities. Taking the first approach can be misleading as prices might not reflect the firms' efficiency but their market power; while the second reveals higher variations in productivity (Foster, Haltiwanger, and Syverson (2008)). With regards to input measure, capital input is usually measured using the net book value of the firms' capital assets. The main drawback of this approach is that the book value might not adequately quantify the services provided by the assets and include assets that are linked to the production process. In this paper, we use the value of machinery and equipment used for production. Such information is available for all the studied countries but Palestine (see data section). In the Palestinian case, there is no choice but to use PCBS's book value of assets. One needs information on intermediate inputs to proceed with parameter estimation. Such information is available for 3 countries only. To keep coherence in the econometric analysis, we adopt a similar approach across countries. Assuming that firm intermediate input per employee is equal to industry average m_t plus an error term (that is $m_{it} = m_t + \mu_{it}$) which is uncorrelated with m_t and K_{it}/L_{it} (log of capital stock), we introduce industry dummies to control for intermediate input in Equation (3).

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in the areas of administrative compliance costs, innovation, and structural reforms linking education, innovation and industrial policies.

[13] The Cob-Douglas production function is widely used in the empirical literature for its simplicity and ease of interpretation, it also performs well using many data sets. The CES has less restrictive assumptions, however, does not perform as well.

[14] Syverson, 2011.

The above model allows us to address a number of the research questions (e.g. is there a difference in productivity between SMEs and large firms everywhere? Is such a difference sector specific or country specific or both?). However, it doesn't allow explaining the potential differences. This is because so far and like many empirical studies in the field, we have assumed A_{it} exogenous. We, now, relax this assumption by assuming that A_{it} is endogenous and depends on a set of variables Z, which gives[15]:

$$\ln TFP = \ln A_{it} + \varepsilon_{it} = \eta \ln Z + \varepsilon_{it} \quad (6)$$

The variables Z will include various firm and industry characteristics and the estimation of their effects will allow explaining the potential difference in productivity between SMEs and large firms.

[15] One should note here that this approach does not allow for the learning by doing phenomenon or if growth itself affects TFP. For more information on learning by doing see Chiang (2004).

4. Data and Descriptive Statistics

Small firms are usually defined as independent owner managed businesses which have a small market share[16]. However, it has now become common practice to define a firm by taking statistical definitions, including the number of employees employed by the firm, the company's turnover, or the company's balance sheet total. Table 1 below provides firm size classifications for each of the comparator countries where available

Table 1: Firm size by number of workers

	Micro	Small	Medium	
	1 - 4	5 - 49	50-99	
Workers	1 - 10	11 - 49	50 - 250	
Turnover (Mil. €)	<2	<10	<50	
Bal. Sheet (Mil. €)	<2	<10	<43	
	<10	<50	<250	
	1-9	10-49	50-199	
	2 - 4	5 - 9	10 - 25	

** Ministry of Foreign Trade, MSME definition study, Phase II, January 2004*

***There are stipulations on turnover and balance sheet as well.*

●*Polish Information and Foreign Investment Agency*

♦*Ayadi, R.(2012) quoting the MSME Country Indicators*

♣ *Small Enterprise Center.*

In conducting the statistical analysis, a unified measure of firm size will be used. For all countries, we distinguish very small (less than 10 workers), small (between 10 and 50 workers), medium (between 20 and 200 workers) and larger firms (between 200 and 500 and above 500 workers). Section 5 provides a discussion of alternatives and motivation of our choice. The main reason is to have comparable methodology and samples for all countries. For example if we use Belgium's definition, Palestine will not have any large firms.

4.1 Data sources

The six countries covered in this report are: Belgium, Egypt, Malta, Morocco, Palestine, and Poland. The firm level data for Palestine were obtained from the Palestine Central Bureau of Statistics (PCBS) for 2004 and 2007; for Malta the data was also obtained from the National Statistical Office and completed by information from "AMADEUS". The data for Belgium and Poland comes from the "AMADEUS" data bank of the firm "Bureau van Dijk". Amadeus contains comprehensive information on around 19 million companies across Europe. The data for Egypt and Morocco come from the World Enterprise Survey of the World Bank. Such a survey provides also data for Palestine. While giving a lot of information, it is only available for one year. We preferred the use of PCBS data which are available for more years. When necessary, the values were converted to thousand Euros using the nominal exchange rate for each of the countries involved. Since the variability of exchange rate makes the observed rate at a given point in time not reflecting the relative competitiveness of economies, the analysis should be conducted in difference terms. This means that it should not focus on the level of productivity but on the difference between the productivity of large and small firms across countries.

4.2 Comparative tables of main indicators

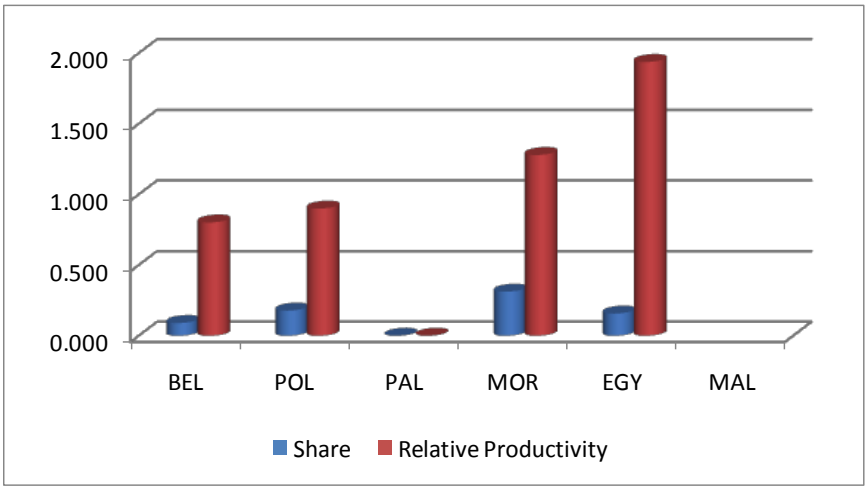
Using the methodology presented in Section 3, we computed labor productivity and Total Factor Productivity over sub-samples of firms of different sizes. We first review the LaP and TFP across firms of all sizes; followed by an analysis of productivity by firm size and industry.

[16] Definition adopted by the Bolton Committee in the 1971 Report on Small Firms

Table 2 below presents the data on productivity and TFP; the data reveal a few remarkable differences across countries. Belgium has the highest productivity in all industries except for Chemicals and Electronics where Poland is nearly twice as productive. The same can be said about Malta in chemicals and electronics. As for the MENA countries, labor productivity is no more than 15% of the Belgian figures at the most. Notably, Palestine, Morocco, and Egypt have the highest productivity figures in the chemicals industry relative to those of Belgium. However, looking at each country individually, the data shows that for Belgium, labor productivity is highest in machinery and equipment while for Poland it is electronics. Palestine and Morocco are similar in that labor productivity is highest in agro-industries with Morocco's being higher than Palestine. The simple mean of LaP across industries is highest for Belgium (€ 46,810) followed by Poland (€ 26,080). For the other countries the figure is around € 2000 with Palestine ranking lowest.

TFP is calculated as the antilog of the residual from the regression of output/worker on a constant and K/L ratio, in thousands of Euros. The TFP figure (viewed as average efficiency) conveys a different message. When the TFP estimate for each industry is viewed relative to those of Belgium we find that MENA countries' estimates are larger for almost all industries. Poland on the other hand has a lower estimate except for textiles. The mean of TFP for all industries is highest for Egypt, indicating highest productivity (€ 2120), while the lowest is for Poland (€1170). The discrepancy between AP and TFP is very distinct for Poland and Belgium where AP is larger than TFP. For the other countries they are similar in magnitude; however, there is no clear pattern that AP is typically larger or lower for all industries. This can be explained by the number of observations by firm size. Large firms (200 workers and above) constitute a smaller proportion of all firms in Palestine and Egypt, compared to Belgium and Poland. On the other hand, the ratio (AP_L/AP_S) which implies relative productivity of large firms is higher in Morocco and Egypt. Figure 1 below depicts this relationship.

Figure 1*: Share and relative productivity of large firms by country (ratios, 2007)



*Share refers to the proportion of firms which have more than 200 employees. The relative productivity refers to the ratio of large to small firms' AP.

Table 2: Average Labor Productivity (LaP) and TFP for manufacturing industries (2007)

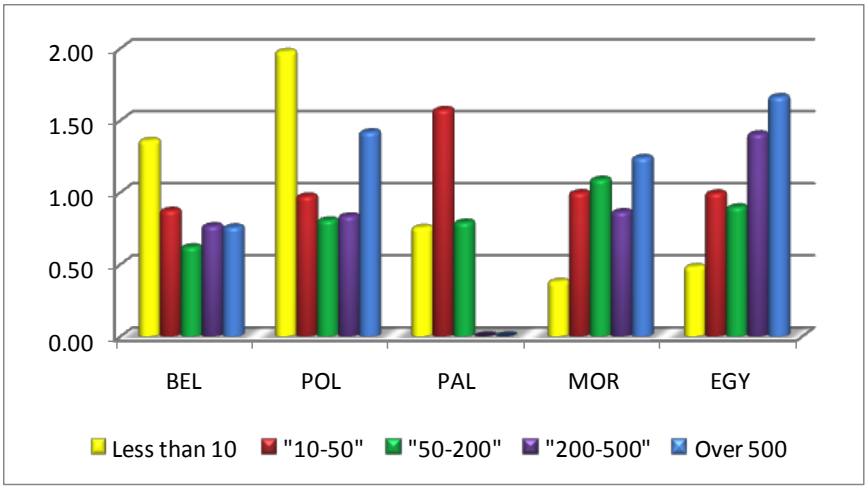
(thousand Euros)

Country	Industry	N*	AP	TFP	Country	N	AP	TFP
Belgium	Agro industries	609	63.11	1.34	Morocco	46	3.33	1.50
	Chemicals	400	16.54	1.37		35	1.83	1.27
	Electronics	222	18.91	1.26				
	Garments	67	33.37	1.52		102	1.32	1.40
	Machinery & equipment	337	68.47	1.29				
	Metal industries	651	60.06	1.25				
	Textiles	150	67.21	1.01		48	2.05	1.27
Poland	Agro industries	692	33.27	1.28	Egypt	104	2.32	2.80
	Chemicals	696	34.09	1.15		79	2.50	1.99
	Electronics	309	36.40	1.18		29	2.10	1.91
	Garments	159	8.40	1.14		86	1.32	1.33
	Machinery & equipment	503	27.35	1.14		23	2.59	2.16
	Metal industries	859	19.37	1.14		107	3.39	3.20
	Textiles	141	23.66	1.14		99	1.71	1.42
Palestine	Agro industries	52	2.50	2.49	Malta	26	18.46	0.99
	Chemicals	36	2.21	1.96		17	33.55	1.00
	Electronics	7	1.14	1.37		21	49.78	1.00
	Garments	6	1.50	1.50			9.00	
	Machinery & equipment	8	1.76	2.01		7	27.01	0.99
	Metal industries	30	2.25	2.01		17	49.78	1.00
	Textiles	22	1.75	1.66		5	12.27	1.00

* There are small variation on the number of observations for TFP; however minor

The share of large firms in all countries seem to be always less than one, but larger in Morocco and Egypt. If small firms are less productive than large firms (Morocco and Egypt), then this country might have low average product and high TFP relative to other countries, Saliola and Seker (2011). The case of Palestine serves as a good illustration; the mean LaP across industries is roughly equal to the mean of TFP because there are no large firms in Palestine.

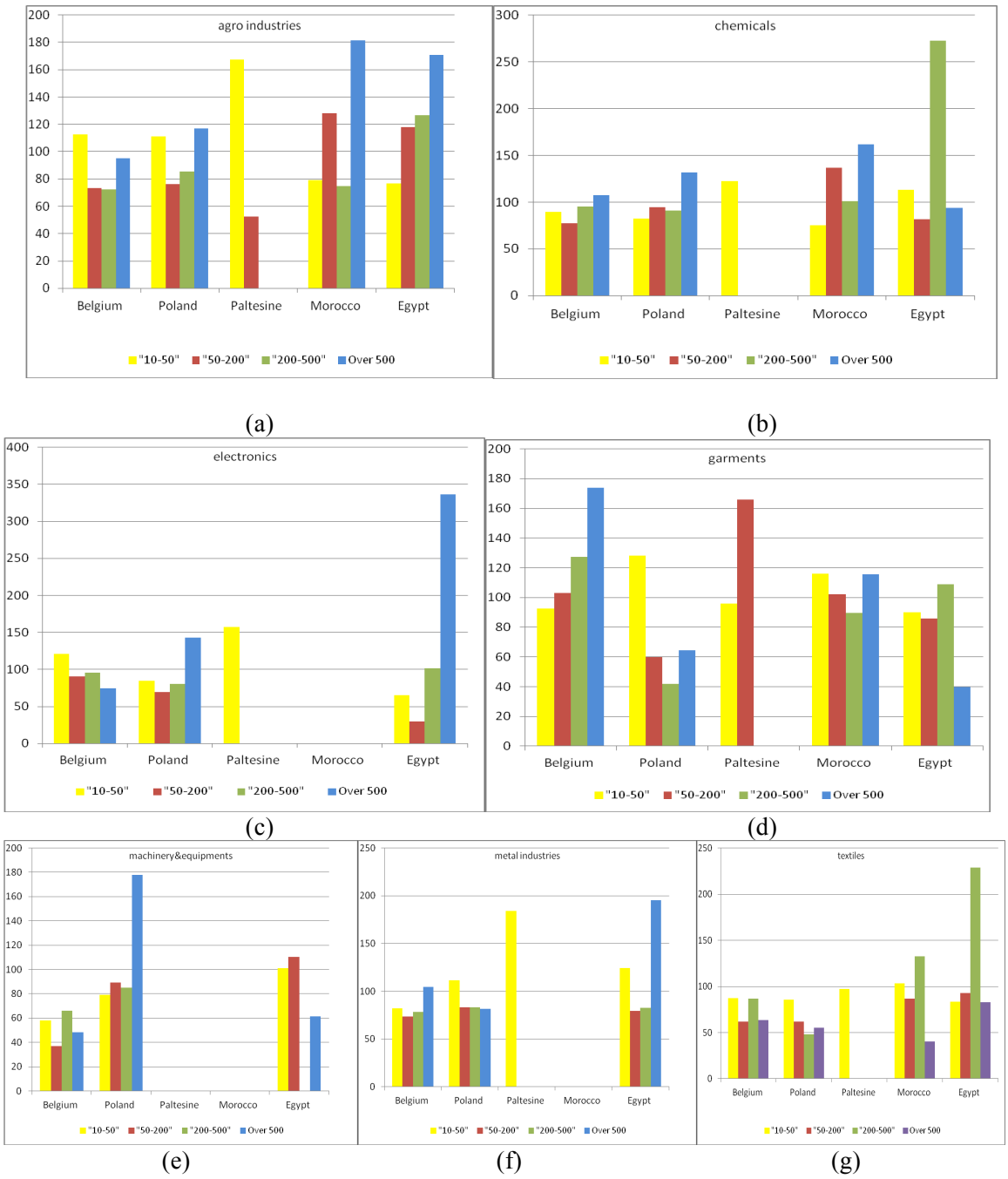
Figure 2: Firm's labor relative productivity by size* (2007)



*Size data is not available for Malta

The data in figure 2 shows the LaP for firms of a particular size relative to the grand average of all sizes In each country. The patterns of Egypt and Morocco are at odds with those for Belgium which displays a negative relation between productivity and firm size. Poland also displays signs of a negative relation. These figures are aggregated over all industries. To show if the industry type matters, this figure is reproduced for all industries.

Figure 3: Firm's labor relative productivity by size and Industry (2007)*



*Size data is not available for Malta

Figure 3 panels (a) to (g) present the results by sector and country. Productivity for firms with less than 10 employees is not reported because the World Enterprise Survey (WES) doesn't collect information for such firms unless they have an output level beyond a given threshold. Hence, comparing productivity for this size across countries would be biased. The panels indicate that larger firms are more productive in machinery & equipment for Poland, in Garments for Belgium,

to some degree in chemicals for Morocco and Belgium, and agro-industries for Egypt. On the other hand, small firms are more productive in textiles for Poland, and in electronics for Belgium. No other trends are distinguishable; for example, larger firms are not always more productive for Belgium or Egypt. Since the technology differs from one industry to another, the choices in terms of optimal size and combination of factors also differ across industries. This makes it logical that firms decide on firm size depending on industry rather than country although the size of the market or the specific products the firm is manufacturing might influence in few instances the choice of firm size in a specific country.

5. Empirical Findings and Policy Implications

The objective of the research is to compare the difference in productivity of SMEs and big firms in the South and the North of the Mediterranean. Moreover, the study explores whether productivity differences exist among SMEs across countries in each region through a sectoral approach. On the importance of considering the size and industry dimensions in studying productivity see Geroski (1998). The study also aims at identifying the major determinants of productivity for SMEs in the Mediterranean.

There are two commonly used measures of productivity: TFP and labor productivity. Although TFP contains more information than labor productivity (Hulten, 2000), it requires a number of assumptions to construct capital stock and factors' shares that it is likely to have more measurement error. Moreover, Disney et al. (2003) argued that labor productivity gives a better reflection of how markets select establishments of different productivity. We focus on labor productivity.

To achieve these objectives the econometric estimation aimed at answering the following questions:

- Question 1. : What is the difference in labor productivity between SMEs and large firms?; i.e. is the difference a general phenomenon?
- Question 2. : Does the difference between SMEs and large firms in terms of labor productivity depend on the industry?
- Question 3. : Does the difference between SMEs and large firms in terms of labor productivity depend on the country?
- Question 4. : Does the difference between SMEs and large firms in terms of labor productivity depend on the country and on the industry?
- Question 5. : How its various determinants affect firms' productivity across size?

One challenging issue in this paper is the construction of firm size dummy variable because of the difference in definitions across countries and the different distribution of firm size across countries. The theory remains silent about drawing size boundary between small, medium, and large firms. One possibility is to use firm size percentiles in each country. However, the resulting percentiles are likely to differ across countries and make comparison meaningless. Using percentiles over all countries might result in Southern countries absent in many classes of size. Other possibilities exist but have their own inconvenience especially in our context i.e. data availability (degree of freedoms in estimation) and comparison between Northern and Southern countries. A reasonable compromise is the **four** classes split we use here: Firms with less than 10 employees, those with more than 10 but less than 50 employees, firms with more than 50 and less than 200 employees and firms with more than 200 employees. This approach insures that there are enough observations in each class for all countries to make comparison meaningful. One can still argue that a less than 50 employees firm in the South is not necessarily behaving as a less than 50 employees firm in the North. The northern one may be more structured and formal than the southern one. This is why regressions are also conducted on each country separately; see Table 5.

The remaining of this section presents 5 sets of regression results (Tables 3 to 7) corresponding to the above questions. All regressions are based on Equation (5) but the way the samples are pooled across industries and countries differ in order to allow addressing each question separately. The common variables to all regressions are the following. The dependent variable is sales per worker. The explanatory variables are the capital to labor ratio, industry dummies, country dummies and size dummies. The sample is pooled over years 2004 and 2007 to get rid of possible specific year's shock. All "monetary" variables have been converted to the same currency: Euros. All variables are in log except dummies. The results for country and size dummies should be read in relative terms. For countries, the reference is Poland. For size, the reference is a firm with more than 200 workers.

Table 3 shows that a 1% increase in the (K/L) ratio leads to roughly 0.4% increase in the output per worker; cross industry variations are not large, the highest reported elasticity is for machinery and equipment (0.47%). Belgium and Egypt differ significantly from Poland. Average productivity

in Belgium is above that of Poland, but the reverse is true for Egypt. For the remaining countries, productivity differences are not significant. The productivity of labor is highest in agro industries (3.014) and is lowest for garments industries (2.106). Differences across industries are not significant as the confidence intervals for the estimated coefficients overlap for all industries.

The reported F-statistic allows answering Question 1. It pertains to the test of the null hypothesis that productivity is the same across firm size against the alternative that such productivity differs. The P-value of the reported F-statistic is equal to zero; rejecting the null hypothesis. Productivity differs across firm size. However, the coefficients of the firm size dummies suggest that the difference is not linear in firm size. On average, firms with less than 10 workers are significantly less productive than firms with more than 200 workers (the reference) while firms with more than 10 but less than 50 workers are significantly more productive than those with more than 200 workers. The difference is not statistically significant for firms with more than 50 and less than 200 workers. The model explains around 75% of the variability in the dependent variable implying a good fit.

Table 3: Productivity and firm size

Variable	Coefficient	t-statistic
Capital to labor ratio		
Agro Industries	0.388	14.865
Textiles	0.398	16.048
Garments	0.450	16.074
Chemicals	0.380	17.461
Metal Industries	0.420	19.253
Electronics	0.462	17.190
Machinery & Equipment	0.470	13.183
Others	0.399	22.660
Industry dummies		
Agro Industries	3.014	28.106
Textiles	2.491	28.202
Garments	2.106	29.480
Chemicals	2.987	31.731
Metal Industries	2.616	29.424
Electronics	2.488	21.605
Machinery & Equipment	2.478	16.100
Others	2.716	37.666
Country dummies [a]		
Belgium	0.655	24.421
Egypt	-1.480	-24.703
Malta	-0.061	-0.740
Morocco	-0.051	-0.868
Palestine	0.058	0.960
Size dummies [b]		
Less than 10 workers	-0.106	-3.879
Between 10 and 50 workers	0.041	1.778
Between 50 and 200 workers	-0.031	-1.464
Number of observations	12784	
Adjusted R^2	0.76	
F-test for equality of coefficients across sizes; P-Value	0.000	

The whole sample is pooled (2004 and 2007). The dependent variable is sales per worker. The explanatory variables are the capital to labor ratio, industry dummies, country dummies and size dummies. All variables are in log except dummies. Method: Ordinary least squares with corrected Standard Errors to insure heteroskedastic-consistency. ***a: The reference is Poland. b: The reference is a firm with more than 200 workers***

Table 3 above indicated that the difference in labor productivity between firms depending on their sizes is not a linear phenomenon. It is of theoretical as well as empirical interest to find out

whether such a difference is specific to some industries (Question 2). The theory suggests that in the long run, firms choose the optimal size[17], and this is expected to vary from one industry to another. Table 4 below allows examining the productivity difference between firms across sizes by industry. Here, again the reference is a firm with more than 200 workers. A negative sign implies that smaller firms have lower productivity than the reference. Similar F-statistic as in Table 3 is reported for each industry. The hypothesis that productivity is the same in large and small firms is rejected at the 1% level for Agro Industries and Metal Industries. The same hypothesis is rejected at the 10% level for Electronics, Machinery & Equipment and "Other industries". The coefficients of the firm size dummies suggest significantly higher productivity of larger firms in agro-industries, chemicals, electronics, and machinery and equipment and partly for electronics. Overall, it seems that the difference does depend on the industry. Where there is a difference, SMEs are less productive than big firms in the same industry.

Table 4: Productivity and firm size by industry

Variable	Coefficient	t-statistic	Number of observations	Adjusted R^2	F-test for equality of coefficients across sizes; P-Value
		Agro Industries			
Less than 10 workers	-0.267	-3.549	2085	0.69	0.00
Between 10 and 50 workers	0.104	1.672			
Between 50 and 200 workers	-0.058	-0.981			
		Textiles			
Less than 10 workers	0.089	0.622	746	0.78	0.55
Between 10 and 50 workers	0.160	1.571			
Between 50 and 200 workers	0.086	0.944			
		Garments			
Less than 10 workers	0.029	0.173	630	0.78	0.57
Between 10 and 50 workers	0.104	0.851			
Between 50 and 200 workers	-0.067	-0.737			
		Chemicals			
Less than 10 workers	-0.165	-1.942	1692	0.74	0.20
Between 10 and 50 workers	-0.030	-0.533			
Between 50 and 200 workers	-0.061	-1.121			
		Metal Industries			
Less than 10 workers	-0.139	-2.006	2151	0.75	0.01
Between 10 and 50 workers	-0.005	-0.078			
Between 50 and 200 workers	0.038	0.659			
		Electronics			
Less than 10 workers	-0.073	-0.748	767	0.74	0.07
Between 10 and 50 workers	0.022	0.306			
Between 50 and 200 workers	-0.161	-1.987			
		Machinery & Equipment			
Less than 10 workers	-0.119	-1.691	1187	0.73	0.09
Between 10 and 50 workers	-0.128	-2.203			
Between 50 and 200 workers	-0.147	-2.998			
		Others			
Less than 10 workers	0.003	0.064	3526	0.73	0.05
Between 10 and 50 workers	0.103	2.331			
Between 50 and 200 workers	0.040	0.962			

The sample is pooled over countries and a separate regression is performed for each industry. The dependent variable is sales per worker. The explanatory variables are the capital to labor ratio, country dummies and size dummies. All variables are in log except dummies. Method: Ordinary least squares with corrected Standard Errors to insure heteroskedastic-consistency. Only the coefficients of interest (pertaining to firm size) are reported for brevity. The reference is a firm with more than 200 workers

[17] Market failure and capital market imperfections may impede firms from reaching their optimal size; in a recent article, Dass, Nanda, and Xiao (2012) find evidence that innovative firms can affect their stock liquidity by taking deliberate actions (such as reducing informational asymmetry and incentivized CEO contracts) as opposed to firms which are less financially constrained.

Given that within the same industry SMEs are sometimes less productive (Table 4) than big firms and that countries have different "portfolio of industries", we examine whether these translate in differing productivity levels across countries (Question 3). Table 5 presents the estimation results disregarding the industry dimension and focusing on the country dimension. The reported P-value of the F-statistic allows rejecting at the 10% level the null hypothesis that productivity is the same across firm size in all countries but Malta. The coefficients of the firm size dummies suggest that smaller firms are less productive in all countries but Malta and Poland. When small firms are less productive, the gap is higher in developing countries (e.g. Egypt versus Belgium).

Table 5: Productivity and firm size by country

Variable	Coefficient	t-statistic	Number of observations	Adjusted R^2	F-test for equality of coefficients across sizes; P-Value
		Belgium			
Less than 10 workers	-0.124	-4.079	6065	0.54	0.00
Between 10 and 50 workers	0.019	0.664			
Between 50 and 200 workers	0.006	0.197			
		Egypt			
Less than 10 workers	-0.587	-3.770	1286	0.19	0.00
Between 10 and 50 workers	-0.288	-2.113			
Between 50 and 200 workers	-0.106	-0.644			
		Malta			
Less than 10 workers	0.303	0.964	123	0.61	0.33
Between 10 and 50 workers	0.335	1.449			
Between 50 and 200 workers	0.494	2.316			
		Morocco			
Less than 10 workers	-0.851	-1.406	542	0.61	0.09
Between 10 and 50 workers	-0.148	-1.522			
Between 50 and 200 workers	-0.017	-0.207			
		Palestine			
Less than 10 workers	-0.737	-2.762	588	0.22	0.00
Between 10 and 50 workers	0.024	0.089			
Between 50 and 200 workers	-0.083	-0.273			
		Poland			
Less than 10 workers	0.259	3.249	4180	0.70	0.00
Between 10 and 50 workers	0.214	9.340			
Between 50 and 200 workers	0.045	2.292			

The sample is pooled over industries and a separate regression is performed for each country. The dependent variable is sales per worker. The explanatory variables are the capital to labor ratio, industry dummies and size dummies. All variables are in log except dummies. Method: Ordinary least squares with corrected Standard Errors to insure heteroskedastic-consistency. Only the coefficients of interest (pertaining to firm size) are reported for brevity. The reference is a firm with more than 200 workers

To be complete, we should address one additional question: Whether the difference between SMEs and large firms in terms of labor productivity depends on the country and on the industry. Indeed, the fact that findings confirm that such a difference exists across sector and, that this is reflected at the country level, doesn't mean that the difference between the North and the South exists for all industries. In other words, there might be industries where SMEs are more productive than large firms in the South while the reverse is true in the North (Question 4). This finding might have important policy implications about the type of firm (in terms of size) and which industry should be fostered in the South. Table 6 gives the results of such an analysis. The results of the F-test confirm the trends found in the previous tables: industry and country differences do exist but *one cannot always say that SMEs are more or less productive than large firms for all countries*. Looking at the coefficients of the size dummies across industries and countries it appears that the difference depends both on the industry and on the country. SMEs can be less productive or more

productive than large firms in the same country depending on the industry. In general, however, SMEs of the 3 Southern countries (Egypt, Morocco, and Palestine) are less productive irrespective of the industry. In the 3 Northern countries, the difference might be negative or positive depending on the industry.

Table 6: Productivity and firm size by country and industry

	Less Than 10 Workers		Between 10 And 50 Workers		Between 50 And 200 Workers		F-Test; Same Coefficients Across Sizes; P-Value	Adjusted R^2
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic		
Agro Industries								
Belgium	0.01	0.14	0.25	3.71	0.11	1.58	0.00	0.55
Egypt	-0.60	-1.53	-0.24	-0.81	-0.39	-0.93	0.55	0.18
Malta	0.00	0.00	0.21	0.77	0.63	2.42	0.95	0.53
Morocco	0.69	3.27	-0.33	-1.43	0.07	0.33	0.90	0.60
Palestine	-0.94	-4.57	0.31	1.17	-0.45	-2.57	0.00	0.19
Poland	0.42	1.73	0.29	4.48	0.06	1.05	0.00	0.71
Textiles								
Belgium	-0.32	-2.32	0.01	0.12	-0.02	-0.23	0.00	0.55
Egypt	-0.12	-0.35	0.06	0.20	0.21	0.64	0.55	0.18
Malta	11.28	3.24	0.00	0.00	-8.35	-2.67	0.95	0.53
Morocco	0.00	0.00	0.05	0.21	0.15	0.63	0.90	0.60
Palestine	-0.74	-5.85	-0.29	-1.24	0.00	0.00	0.00	0.19
Poland	0.49	1.53	0.22	2.43	0.08	1.06	0.00	0.71
Garments								
Belgium	-0.37	-1.47	-0.15	-0.60	0.13	0.56	0.00	0.55
Egypt	-0.69	-2.43	-0.54	-2.07	-0.41	-1.18	0.55	0.18
Malta	..	..	..	..	..	..	..	..
Morocco	0.00	0.00	0.09	0.51	-0.13	-1.07	0.90	0.60
Palestine	-1.11	-1.22	-0.48	-0.61	..	..	0.00	0.19
Poland	1.58	7.75	0.79	6.73	0.27	3.18	0.00	0.71
Chemicals								
Belgium	-0.22	-1.92	0.00	-0.02	0.00	0.01	0.00	0.55
Egypt	-1.17	-3.14	-0.64	-2.02	-0.43	-0.99	0.55	0.18
Malta	0.36	0.66	-0.29	-0.93	0.18	0.57	0.95	0.53
Morocco	-1.51	-3.52	-0.36	-2.03	-0.09	-0.44	0.90	0.60
Palestine	-0.28	-0.31	0.18	0.20	..	..	0.00	0.19
Poland	0.42	3.60	0.30	5.77	0.07	1.59	0.00	0.71
Metal Industries								
Belgium	-0.21	-3.21	-0.06	-1.06	0.02	0.36	0.00	0.55
Egypt	-0.50	-1.02	-0.15	-0.33	0.09	0.17	0.55	0.18
Malta	-0.19	-0.46	-0.25	-1.17	..	..	0.95	0.53
Morocco	..	..	..	..	..	..	..	..
Palestine	-0.84	-2.27	..	..	..	..	0.00	0.19
Poland	-0.15	-0.71	0.21	4.28	0.14	3.05	0.00	0.71
Electronics								
Belgium	0.02	0.26	0.11	1.47	0.01	0.15	0.00	0.55
Egypt	-1.11	-2.59	-0.37	-0.92	-0.22	-0.39	0.55	0.18
Malta	0.77	0.77	0.85	0.90	1.07	1.12	0.95	0.53
Morocco	..	..	..	..	..	..	..	..
Palestine	..	..	..	..	..	..	..	..
Poland	0.06	0.40	0.05	0.74	-0.23	-3.37	0.00	0.71

Table 6: continued

Machinery & Equipment								
Belgium	-0.25	-3.04	-0.15	-1.89	-0.18	-2.41	0.00	0.55
Egypt	-1.21	-3.92	-0.89	-2.17	-0.58	-1.22	0.55	0.18
Malta	0.00	0.00	0.07	0.32	0.19	3.52	0.95	0.53
Morocco	..	..	..	..	..	..	..	..
Palestine	-0.75	-1.86	..	..	..	..	0.00	0.19
Poland	0.65	4.57	-0.01	-0.18	-0.03	-0.56	0.00	0.71
Others								
Belgium	-0.03	-0.56	0.04	0.70	0.04	0.67	0.00	0.55
Egypt	-0.61	-1.93	-0.38	-1.33	0.04	0.11	0.55	0.18
Malta	-0.06	-0.12	0.67	1.66	-0.07	-0.37	0.95	0.53
Morocco	0.00	0.00	-0.29	-1.07	0.04	0.13	0.90	0.60
Palestine	-0.94	-6.47	-0.26	-1.83	-0.20	-0.66	0.00	0.19
Poland	0.08	0.42	0.23	4.81	0.07	1.70	0.00	0.71

The sample is pooled over industries and a separate regression is performed for each country. The dependent variable is sales per worker. The explanatory variables are the capital to labor ratio, industry dummies, country dummies and size dummies interacted with industry dummies. All variables are in log except dummies. Method: Ordinary least squares with corrected Standard Errors to insure heteroskedastic-consistency. Only the coefficients of interest (interaction of firm size dummy with industry dummy) are reported for brevity. The reference is a firm with more than 200 workers. The ".." means that the corresponding size for the corresponding industry does not exist in the country's sample.

The above results (Table 6) suggest that the difference between SMEs and large firms in terms of labor productivity is deeply rooted in the region dimension: SMEs are always less productive in the South while in the North difference might be negative or positive depending on the industry. Therefore a natural question arises, which determinants are behind this situation. In the following we will investigate such determinants.

Based on the discussion in Section 2 and given the available data, we are able to consider four determinants of productivity. These are the age of the firm, the share of exports in a firm's output, the intensity of competition in the industry and the technological intensity of the industry[18]. Young businesses may have low levels of productivity because of the necessity to learn about technology and management. Bartel and Lichtenberg (1987) provided further discussion on the relationship between labor productivity and the age of plants. Export orientation of the firm is included because Bernard et al. (2003) observed higher productivity among exporters and pointed to the role of early foray in making exporting plants have high productivity and large size. This is similar to the notion of 'learning from exporting' by Tybout et al. (1998). The technological intensity of the industry is added to the regression because it may increase productivity directly and may induce adoption of new inventions and lead to better organization, management and more efficient combination of inputs (De Long and Summers, 1991). Empirical support to this idea is provided by Coe et al. (1997). The intensity of competition in the industry may push firms to improve productivity. Sekkat (2009) examined the relationship between competition and efficiency in the manufacturing sector of Egypt, Jordan and Morocco. The empirical analysis revealed that productivity growth is significantly and negatively affected by the lack of competition.

To summarize, we regress the sales per worker on the capital to labor ratio, the age of the firm, the share of exports in a firm's output, dummy for the intensity of competition in the industry, technological intensity of the industry and a year dummy. The dummy for high intensity of competition in Egypt and Morocco are based on the response to the question in the WES. For

[18] We pointed earlier that corporate governance may be an important factor affecting firm performance, however, the lack of data does not allow the investigation of this factor.

Palestine, we computed the C4 concentration index and assume that competition is low if the index is above 70%. The technological intensity is computed as the average capital-labor ratio at the industry level using the data. Finally, since estimation is conducted on 2004 and 2007, a dummy for the year 2007 is also introduced.

Table 7: Firm productivity, other determinants

Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
	Egypt		Morocco		Palestine	
Less than 10 workers						
Age	-0.004	-0.698	..	..		
Exports	-0.114	-2.328	..	..	-0.026	-0.093
Dummy for high Competition	0.37	1.822	..	..	1.131	4.897
Technological intensity	-0.002	-0.677	..	..	0.609	1.687
Number of observations		133	..	..		153
Adjusted R2		0.08	..	..		0.07
Between 10 and 50 workers						
Age	0.001	1.144	0.006	0.964	..	..
Exports	0.077	3.86	0.418	3.869	-0.377	-1.912
Dummy for high Competition	-0.05	-0.591	0.22	1.134	1.212	2.871
Technological intensity	0.002	2.35	0.074	4.181	0.287	0.404
Number of observations	676		159		76	
Adjusted R2	0.19		0.28		0.13	
Between 50 and 200 workers						
Age	0.002	0.455	0.014	2.946	..	..
Exports	0.04	1.167	0.412	5.946	-2.938	-1.882
Dummy for high Competition	0.198	1.252	0.224	1.539	34.364	1.069
Technological intensity	0.002	0.812	0.07	2.877	-13.223	-0.918
Number of observations	239		162			12
Adjusted R2	0.05		0.47			0.18
More than 200 workers						
Age	0.001	0.37	0.014	3.543	..	..
Exports	0.023	0.875	0.533	10.224	..	..
Dummy for high Competition	-0.281	-1.049	0.26	2.257	..	..
Technological intensity	0.005	2.558	0.007	0.439	..	..
Number of observations	146		105			
Adjusted R2	0.15		0.76			

The sample is pooled over industries and a separate regression is performed for each country and firm size. The dependent variable is sales per worker. The explanatory variables are the capital to labor ratio, the age of the firm, the share of exports in a firm's output, dummy for the intensity of competition in the industry, technological intensity of the industry and a year dummy. All variables are in log except dummies. The dummy for high intensity of competition in Egypt and Morocco are based on the response to the question in the WES. For the other countries, we computed the C4 concentration index and assume that competition is high if the index is above 60%. The technological intensity is computed as the average capital-labor ratio at the industry level using UNIDO. Method: Ordinary least squares with corrected Standard Errors to insure heteroskedastic-consistency. Only the coefficients of interest are reported for brevity. The reference is a firm with more than 200 workers. The ".." means that the corresponding size or variable does not exist in the country's sample.

Table 7 reports the results of the four determinants of productivity discussed above. The age of the firm is never significant except in Morocco for firms with more than 50 workers. The coefficient is positive implying that older firms in that set are more productive than younger. In Palestine, the coefficients of exports orientation are significant and negative (although at the 10% level only) in firms with more than 10 and less than 200 workers. Since the Palestinian economy is under Israeli occupation with severe movement and access restrictions, exports do not play a major role for

Palestinian firms. In Egypt there is no consistent pattern of the coefficient of export orientation across firm sizes. In contrast, the corresponding coefficient is consistently significant and positive across all firm sizes in Morocco. In Egypt, the coefficient of high competition is significantly positive (although at 10%) only for firms with less than 10 workers. It is not significant for other firm sizes. In Palestine, the same coefficient is significantly positive for the two lowest size classes: with less than 10 workers and with more than 10 and less than 50 workers. In Morocco, the coefficient is positive for all classes of size but significant only for the class with more than 200 workers. High competition positively and significantly affects productivity of small firms but not larger firms in Egypt and Palestine. The table also shows that for small firm (less than 50 workers), technological intensity positively affect productivity in the three countries. It affects productivity of larger firms only in Morocco and Egypt.

6. Conclusions and Recommendations

Given their importance not only for employment and poverty reduction but also for R&D and growth, this paper focuses on the status of productivity in SMEs of selected Southern-Mediterranean countries compared to the Northern countries in order to suggest recommendations for its improvement. The increasing openness of many developing countries is putting firms in the face of intense competition. To survive, they must improve their competitiveness in both domestic and foreign markets. One way of improving firm competitiveness is increasing productivity.

The analysis focuses on three Southern (Egypt, Morocco and Palestine) and three Northern (Belgium, Malta and Poland) countries using firm level data for two years (2004 and 2007). It presents a comparative analysis of firms' productivity by size, industry and country as well as identifies the main determinants of SMEs productivity in Southern countries.

The results of the econometric analysis show that the difference in productivity between SMEs and large firms is not a general phenomenon. Rather, such a difference seems to depend on the industry. Where there is a difference, SMEs are less productive than big firms in the same industry. Combined with the fact that countries have different "portfolio of industries", this finding induces a difference in productivity across countries. However, the fact that findings suggest that such a difference exists across sectors and that this is reflected at the country level, does imply that the difference between countries exist for all industries. Further investigations showed that the difference depends both on the industry and on the country. SMEs can be less productive or more productive than large firms in the same country depending on the industry. In spite of this, we found that SMEs of the 3 Southern countries (Egypt, Morocco, and Palestine) are less productive irrespective of the industry while in the 3 Northern countries, the difference might be negative or positive depending on the industry. The contrast between the North and the South reflects that, in spite of their similar size, these might be different types of companies e.g. one with corporate behavior and others with informal family type of behavior.

To highlight the factors behind the situation in Southern countries, the analysis investigated the determinants of productivity by firm size in these countries. Based on the available data, we considered four determinants of productivity. These are the age of the firm, the share of exports in a firm's output, the intensity of competition in the industry and the technological intensity of the industry. Although with some differences across the three countries, the findings showed that export orientation has a positive impact on SMEs productivity but not on large firms. A high intensity of competition has a positive effect on the productivity of all firms but the effect is much higher for SMEs. Finally, SMEs in technologically intense industry are more productive than large firms in the same industry.

The effect of the above factors is well established for firms' productivity in general (i.e. without split by size). The novelty here is their different impact across firm size. With respect to SMEs, a number of policy recommendations emerge. First, intense competition seems to boost their productivity. Hence, enforcement of competition policy seems to be a good instrument for improving SMEs productivity. Many Southern countries have adopted a competition policy. However, its enforcement varies greatly across countries. Second, better access to high technology also affects SMEs productivity. This is especially true for capital. The cost of using capital encompasses a number of components such as getting credit, protecting investors, paying taxes, enforcing contracts etc. Comparisons across 170 countries over the World show that in 2005 Southern countries exhibit in general disappointing records. They have, however, recently implemented a number of reforms to address the problem of access to financial resources for investments. Third, SMEs productivity improvement can also be achieved through more export orientation. Interestingly comparison with major exporters from Asia (Korea and Japan) shows that although the obstacles to exporting are higher in Southern countries, the differences are not dramatic. The problem may come from the export strategies which seem less active in terms of promotion, advertising, lobbying etc.

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