Firm Heterogeneity and Productivity: The Contribution of Microdata

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Abstract

Without claiming to be a comprehensive treatment of all relevant issues related to the firm productivity analysis, this note aims to investigate some areas of inquiry in this field where firm level data are most valuable, and to survey the more recent econometric evidence for Arab countries.

عدم تجانس المؤسسات و الإنتاجية: مساهمة البيانات الجزئية

ملخص

دون الادعاء بتقديم معالجة شاملة لجميع القضايا المتعلقة بفهم و تحليل ديناميكية إنتاجية المؤسسات، تهدف هذه المذكرة إلى عرض أهم التطورات النظرية و التطبيقية الحديثة ذات الصلة بمحددات إنتاجية المؤسسة و التي تعتمد بالأساس على البيانات الجزئية و البيانات المقطعية عبر الزمن، كما تهدف إلى مسح الأدلة التجريبية الحديثة في هذا المجال و المتوفرة لبعض الدول العربية.

Introduction

Productivity, in the form of technical progress and production efficiency, is actually seen as the major source of economic growth in many Arab economies. Productivity particularly in the manufacturing industry, as the place of innovation and the engine of growth, is also central to international competitiveness, as Arab countries face the increasing pressure of globalization. Understanding the factors that affect industrial performances provides therefore important policy implication in this region of the world, which does not benefit from a diversified economy and a substantial manufacturing export capacity. Although Arab countries are, in average, defined as middle income countries, economic performance in the region has most of the time been disappointing. This has been the case of total factor productivity, labor productivity and investment for more than two decades.

Strange as it may seem, in the light of market-oriented reforms which many Arab countries have been implementing over the last three decades, there are not many empirical studies on the field of market dynamics and firms performance in these economies. There is still a lot to be done and learnt in this field.

In contrast with the attention paid to macro aspects, there is very limited empirical detailed evidence on the topic of market selection process and firm productivity within this area of the world, the major constraint to empirical analyses being the availability, accessibility and dissemination of firm-level data. Confidentiality is most often used against accessibility of microdata and few Arab countries have a clear microdata dissemination policy. Absence of reliable industrial census data coupled with the accessibility problem has prevented so far studies that try to understand market dynamics and firm productivity in Arab countries. An exception is the recent contribution of Sekkat (2009, 2008).

The availability of microdata could raise challenges and opportunities that are likely to improve our understanding of the competitive environment, the selection process and the key drivers of productivity improvement in Arab economies. One of the key advantages of microdata is that they permit the examination of a great deal of variability that occurs at lower levels, and that macro statistics often mask. This type of data plays an important role in informing policy.

Without claiming to be a comprehensive treatment of all relevant issues related to the firm productivity analysis, this note aims to investigate some areas of inquiry in this field where firm level data are most valuable, and to survey the more recent econometric evidence for Arab countries.

The note is divided into three parts. Section 1 focuses on three static predictions of the new trade theory that have attracted attention from empiricists. Section 2 briefly reviews the recent applied research on the reasons behind firms' heterogeneity and market selection. Finally, Section 3 recaps what is known in the Arab countries.

Section 1: Firm-level Data, Productivity and the New Trade Theory Paradigm

Over the past two decades, trade liberalization has become an important part of many countries' development strategies. Advocates of liberalization argue that opening up local markets to foreign competition and foreign direct investment can lead to improvements in the productivity of domestic industries, resulting in a more efficient allocation of resources and greater overall output. Critics warn that domestic firms may not be able to realize efficiency gains, because they are unable to successfully adapt foreign technologies to local methods of production or because domestic firms face binding credit constraints that prevent expansion of efficient industries as well as investments in new technology. Which of these two views is closer to the truth has important implications for trade policy: if the latter holds, benefits of liberalization may not be realized unless additional policies are devised to facilitate technology transfer or ease credit constraints.

Two decades ago, in an effort to become more relevant and to address many real world aspects of trade that have been henceforth largely ignored, trade theorists began developing models with imperfectly competitive product markets and heterogeneous firms. The result was a richer body of theory that describes how commercial policy might affect price-cost mark-ups, firm size, productivity, exports, and profitability of domestic producers. The literature also yielded formal representations of the channels through which commercial policy might influence growth.

This section focuses on three static predictions of the new theory trade that have attracted attention from empiricists:

1. Protection can change firms' pricing behavior, thereby affecting the allocative efficiency of the economy and the distribution of real income.

2. When trade policies affect prices they generally also change the set of active producers, their output levels, or both. These adjustments induce productivity changes through scale effects and market share reallocations.

3. Exporters are systematically more productive than non exporters and the reductions in world-wide barriers to trade increase profits that existing exporters can earn in foreign markets, and reduce the export productivity cutoff above which firms export.

1.1. Pricing behavior: Mark-ups, Scale and Productivity

Theory

Except when collusive equilibria are considered, trade models with imperfect competition treat firms' pricing decisions as determined by static profit maximization. Accordingly,

the ratio of output prices (p) to marginal costs (c) is typically a decreasing function of the elasticity of demand (η) that firms face:

$$\frac{p}{c} = \left(\frac{\eta}{\eta - 1}\right) \qquad (1)$$

It follows that when trade liberalization increases the elasticity of demand (η), mark-ups should fall. This kind of elasticity effect has been generated by a variety of modeling devices (Bhagwati, 1978, Krugman, 1979, Helpman and Krugman, 1985, Devarajan and Rodrik, 1991).

When collusive equilibria are modeled, trade liberalization can change the pay-off to defecting, change firms' ability to punish defectors, or make it more difficult to detect them. It is possible that cooperative behavior will become unsustainable and mark-ups will fall. Or, some have argued that collusive firms are likely to use the (exogenous) tariff-distorted price of imports as a reference price. By construction, models that begin from this latter pricing rule predict that trade liberalization will depress the price of import-competing goods.

Evidence

Given the widespread appeal of import discipline arguments, and given the many possible forms they might take, many applied economists tried to document their nature and measure their importance. Two developments during the past quarter-century have made it possible for the researchers to respond in force. One is that numerous plant and firm-level data sets have accumulated over sufficient time spans to support econometric inference. The other is that many developing countries have dramatically liberalized their trade regimes, generating a number of natural experiments.

Levinsohn (1993) finds that price-marginal cost mark-ups fell in Turkish industries where trade was liberalized, and increased in industries where trade protection was increased. Similarly, Harrison (1994) finds that mark-ups are negatively related to import competition in the Cote d'Ivoire, and Krishna and Mitra (1998) present evidence that mark-ups fell during the trade reform period in India.

Tybout (2003) gives a more detailed survey of the existing empirical literature and Table 1 summarizes a subset of the resulting studies, grouped by country-specific liberalization episode. For each episode, evidence on plant- or firm-level productivity gains and their relation to measures of trade protection is summarized (column 4). Further, since productivity gains due to intra-plant innovations are conceptually distinct from those due to market share reallocations (including entry and exit), evidence that isolates reallocation effects when it is available is cited (column 5). Finally, to give some indication of whether competitive pressures intensified with trade liberalization, studies that relate price-cost mark-ups to openness proxies are presented in column 6.

1.2. The firm size distribution and its effects on productivity

Theory

Investigation of the scale effects of trade liberalization has implications for both normative and positive analysis of trade policy. Since output expansion by firms in increasing returns sectors lowers the average cost of production, increased scale could be an important source of welfare gains. Lower average cost generates 'infra-marginal' gains that may be more important than the marginal gains associated with price reductions.

According to Head and Ries (1999) and in the absence of collusive behavior, unilateral trade liberalization either reduces firm size when there are entry/exit barriers or markets are segmented or leaves it unchanged when entry and exit are free. Alternatively, when firms collude to slightly undercut the tariff-inclusive price of imports, trade liberalization *cum* free entry and scale economies forces import-competing firms that remain in the market to operate on a larger scale.

However, the invariance of firm size under free entry and no collusion is an artifact of the Dixit-Stiglitz demand system that is used in the models they consider. More generally, free entry is consistent with firm size adjustments whenever trade liberalization induces changes in the demand elasticities that domestic firms perceive. In particular, when demand elasticities rise with liberalization, price-cost mark-ups are squeezed according to equation (1), and this should induce exit until the remaining firms can make up on volume what they lost on margin.

Trade economists have focused mainly on the ways the changes in the size distribution affect productivity. To summarize these effects, Tybout and Westbrook's (1995) decomposition of industry-wide productivity growth rate is adopted:

$$\frac{dB_t}{B_t} = \underbrace{\sum_{i=1}^{n_t} \frac{dg_{it}}{g_{it}} (\mu_{it} - 1) \frac{q_{it}}{q_t}}_{Scale\ Effects} + \underbrace{\sum_{i=1}^{n_t} dS_{it} \frac{B_{it}}{B_t}}_{Market\ Share\ Effects} + \underbrace{\sum_{i=1}^{n_t} \frac{dA_{it}}{A_{it}} \frac{q_{it}}{q_t}}_{Technical\ efficiency\ effects} \qquad (2)$$

where:

$S_{it} = g_{it} / \sum_{i=1}^{n_t} g_{it}$ designs the firm's market share in terms of its input use,

$\mu_{it} = dln(q_{it}) / dln(g_{it})$ measures returns to scale at the i^{th} firm in year t,

q_{it} corresponds to the output of the i^{th} firm in year t,

$B_{it} = q_{it} / g_{it}$ represents the firm's productivity level

A_{it} designs the firm's total factor productivity

Andrew Bernard et al. (2000) have used a static model to study the effects of liberalization on the size and productivity mix of producers. They show that when firms

use Bertrand pricing rules to compete, trade liberalization expands the market shares of the most efficient firms by providing them with larger export markets, and it forces firms at the low-end of the productive efficiency spectrum to shut down as they face competition from abroad. More recently, Melitz and Ottaviano (2008) have developed a rich and tractable model that predicts how a wide set of industry performance measures including productivity, size, price and mark-up respond to changes in the world trading environment. Their model incorporates heterogeneous firms and endogenous mark-ups that respond to the toughness of competition in a market. In such a setting, they show how market size induces important changes in industry performance measures: larger markets exhibit tougher competition resulting in lower average mark-ups and higher aggregate productivity.

Evidence

Trade-Induced Size Adjustments

Many analysts have fit cross-sectional regressions that relate firm size measures to the intensity of import competition, controlling for a few other factors like domestic market size. The literature finds that import competition reduces the average plant size, if it has an effect at all. Further, studies that include export shares in the explanatory variable set find that average plant sizes are relatively large in the export-oriented industries. However, this literature has several limitations: first, domestic output appears in the denominator of import penetration rates probably causing spurious negative correlation between output per firm and this foreign competition proxy; second, causality may run from size to protection in particular in the industries that are dominated by few large producers; finally, most of these studies presume that firms in all industries will adjust to foreign competition in the same way which runs contrary to the theoretical prediction that industries with low entry barriers are likely to show relatively less size adjust and more adjustment in the number of active firms.

Comparing industrial census data before and after Chile's trade liberalization, Tybout, de Melo and Corbo (1991) find that *plants in sectors with relatively large declines in protection have shown a greater tendency toward employment reductions.* Similarly, Tybout and Westbrook (1995) find that during Mexico's unilateral trade liberalization of 1984-89, firms in the sectors that underwent relatively large reductions in license coverage ratios tended to grow relatively slowly, while firms grew quickly in sectors with rapid export growth.

Trade-induced market share reallocations

Tybout (1991) uses revenue per worker as his productivity measure and measures share-based gains for Chile (1979-1985), Colombia (1977-1987) and Morocco (1984-1987). He finds that market share reallocations contribute to productivity growth among tradeable goods, but his data span periods of major macro shocks rather than major trade liberalization episodes so it is difficult to argue that the gains are trade-induced.

Using the same Chilean data set Pavcnik (2000) measures total factor productivity much more carefully and also finds that the shifting of market shares toward more efficient plants was an important source of efficiency gain during the sample period. However, she does not investigate the link between market share reallocations and foreign competition.

Tybout (1991), Liu (1993), Liu and Tybout (1996), and Pavcnik (2000) all find that exiting plants were substantially less productive than surviving plants in Chile (and elsewhere), but none of these studies links this gap to import competition or exporting opportunities.

Tybout and Westbrook (1995) have a better basis for inference in the unilateral Mexican liberalization of 1984-1989. Using equation (2), as well as a similar decomposition based on cost functions, they find that this liberalization was associated with efficiency gains, and that some of these gains were due to market share reallocations. However, they do not find strong evidence that rationalization effects were concentrated in the tradeable goods industries.

In sum, market share reallocations (including entry and exit) do matter, but it is difficult to find empirical studies that convincingly link these processes to the trade regime. This is not surprising, given that the effects of import competition on industrial evolution are inherently dynamic, and poorly captured by contemporaneous, reduced form correlations.

Trade-Induced Size Adjustments and Scale Efficiency

Tybout and Westbrook (1995) used panel data on Mexican firms to estimate returns to scale μ_{it} as a function of size. Then they combine these estimates with the firm-specific growth rates observed during Mexico's unilateral trade liberalization of 1984-1990 to implement equation (2). Although the cumulative weighted-average growth rate in output was 53 percent for the manufacturing sector, they find that the associated productivity growth rate due to scale efficiency effects was only one-half of one percentage point. This reflected the fact that large plants were operating in the flat portions of their average cost schedule, and these plants accounted for the bulk of the output adjustments.

1.3. Productivity differentials between exporters and non exporters

Theory

Two alternative but not mutually exclusive hypotheses about why exporters can be expected to be more productive than non-exporting firms are generally discussed in the literature and investigated empirically (Bernard and Jensen 1999; Wagner 2007):

1. The first hypothesis points to self-selection of the more productive firms into export markets. The reason for this is that there exist additional costs of selling goods in foreign countries. The range of extra costs include transportation costs, distribution or marketing costs, personnel with skills to manage foreign networks or production costs in modifying current domestic products for foreign consumption. These costs provide an entry barrier that less productive firms

cannot overcome. Furthermore, the behavior of firms might be forward-looking in the sense that the desire to export tomorrow may lead a firm to improve performance today to be competitive in the foreign market. Cross-section differences between exporters and non-exporters, therefore, may in part be explained by ex-ante differences between firms: The more productive firms become exporters.

2. The second hypothesis points to the role of learning-by-exporting. Knowledge flows from international buyers and competitors help to improve the post-entry performance of export starters. Furthermore, firms participating in international markets are exposed to more intense competition and must improve faster than firms who sell their products domestically only. Exporting makes firms more productive.

As noted previously, Melitz (2003) has proposed a particularly tractable framework which has stimulated a great deal of analysis into the implications of firm heterogeneity for a wide range of issues in international trade. In his model, a competitive fringe of potential firms can enter an industry by paying a fixed entry cost, which is thereafter sunk. Potential entrants face uncertainty concerning their productivity in the industry. Once the sunk entry cost is paid, a firm draws its productivity from a fixed distribution. Productivity remains fixed thereafter, but firms face a constant exogenous probability of death. Firms produce horizontally differentiated varieties within the industry under conditions of monopolistic competition. The existence of fixed production costs implies that firms drawing a productivity level below some lower threshold (the zero-profit productivity cutoff) would make negative profits if they produced, and therefore these firms choose to exit the industry. Fixed and variable costs of exporting ensure that, of the active firms in an industry, only those who draw a productivity above a higher threshold (the export productivity cutoff) find it profitable to export in equilibrium (self-selection hypothesis).

In the considered model, reductions in world-wide barriers to trade increase profits that existing exporters can earn in foreign markets and reduce the export productivity cutoff above which firms export. Labor demand within the industry rises, due both to expansion by existing exporters and to new firms beginning to export. This increase in labor demand bids up factor prices and reduces the profits of non-exporters. This reduction in profits in the domestic market induces some low-productivity firms who were previously marginal to exit the industry. As low-productivity firms exit and as output and employment are reallocated towards higher-productivity firms, average industry productivity rises.

Melitz heterogeneous-firm model captures the interaction between firm heterogeneity and international trade, with the productivity advantage of exporters explained by the self selection of the most productive firms into exporting. The shift in resources from low to high productivity firms generates improvements in aggregate productivity. During this shift, exporters grow more rapidly than non-exporters in terms of size and employment.

The model features simultaneous job creation and job destruction within industries as low productivity firms exit and high-productivity firms expand.

Heterogeneous firms are also integrated into the standard trade paradigm of Helpman and Krugman (1985) in Bernard, Redding and Schott (2007). The resulting framework explains why some countries export more in certain industries than in others (endowment-driven comparative advantage); why nonetheless two-way trade is observed within industries (firm level horizontal product differentiation combined with increasing returns to scale); and why, within industries engaged in these two forms of trade, some firms export and others do not (self-selection driven by trade costs). In this paper, the fraction of exporting firms and the share of exports in firm shipments varies systematically across industries and countries with comparative advantage.

Trade liberalization in this framework not only generates aggregate welfare gains but also has implications for the distribution of income across factors. Increases in average industry productivity arising from trade liberalization drive down goods prices and therefore raise the real income of all factors. If productivity increases are strong enough, the real income of a country's scarce factor may even rise during trade liberalization (a contradiction of the well-known Stolper-Samuelson theorem). More generally, the productivity gains induced by the behavior of heterogeneous firms dampen the decline of the real income of the scarce factor that occurs in more neoclassical settings.

Evidence

The finding that exporters are systematically more productive than non-exporters raises the question of whether higher-productivity firms self-select into export markets, or whether exporting causes productivity growth through some form of "learning by exporting." Results from virtually every study across industries and countries confirm that high productivity precedes entry into export markets. These findings are suggestive of the presence of sunk entry costs into export markets that only the most productive firms find it profitable to incur, as emphasized in Roberts and Tybout (1997). Most studies also find little or no evidence of improved productivity as a result of beginning to export; for example, the work of Bernard and Jensen (1999) on U.S. firms and the work of Clerides, Lach and Tybout (1998) on firms in Mexico, Colombia and Morroco find no differential growth in firm productivity among exporters versus non-exporters. However, some recent research on low income countries finds productivity improvement after entry. Van Biesebroeck (2005), for example, reports evidence that exporting raises productivity for Sub-Saharian manufacturing firms[1].

In contrast to the relative scarcity of studies finding improved firm productivity following entry into export markets, an abundance of evidence indicates that firms entering export markets grow substantially faster in employment and output than non-exporters. The

[1] Evidence in favor of additional productivity gains from exporting, has been found by Aw et al. (2000) in Korea, Girma et al. (2003) in UK, Yasar et al. (2004b) in Turkey, De Loecker (2005) in Slovenia, and Van Biesbroeck (2005) in Cote-d'Ivoire. No evidence of learning has been found in Clerides et al. (1998), Bernard and Jensen (1999), Wagner (2002), Arnold and Hussinger (2004).

combination of higher initial productivity and faster growth after commencing exporting, points to an important role for trade liberalization in enhancing aggregate productivity through reallocation across firms.

While much of the existing empirical literature has concentrated on differences in productivity and size between exporters and non-exporters, evidence also shows that exporters and non-exporters display marked differences in factor intensity. The finding that U.S. exporters are more capital and skill intensive suggests that "old" trade theory concepts of comparative advantage may be at work within industries. Specifically, if the intensity with which firms use inputs reflects the characteristics of the goods they produce, then firms which are more capital and skill intensive are producing goods that are more consistent with U.S. comparative advantage (Bernard, Jensen and Schott, 2006). However, it is hard to explain in terms of old trade theory concepts of comparative advantage the finding that exporters are also more capital and skill intensive in developing countries, which are likely to be abundant in unskilled labor (Alvarez and Lopez, 2005). If exporting firms in labor abundant developing countries were specializing in goods consistent with comparative advantage, they would be labor intensive rather than capital and skill intensive.

Summarizing the results from a comprehensive survey of the empirical literature that covers 45 studies with data from 33 countries published between 1995 and 2006, Wagner (2007) argues that the big picture that emerges after some ten years of micro-econometric research in the relationship between exporting and productivity is that exporters are more productive than non-exporters, and that the more productive firms self-select into export markets, while exporting does not necessarily improve productivity.

However, this big picture hides a lot of heterogeneity. Cross-country comparisons, and even cross-study comparisons for one country, are difficult because the studies differ in details of the approach used. Therefore, the jury is still out on many of the issues regarding the relationship between exporting and productivity, including the absolute size of the productivity advantage needed to clear the export market hurdle and the reasons for differences in this size between countries, the reasons for the existence or not of learning-by exporting effects in some countries, the determinants of ex-ante productivity premia of export starters, and the mechanisms by which learning from exporting occurs.

One promising approach to generate stylized facts in a more convincing way suggested in Wagner (2007) is to co-ordinate micro-econometric studies for many countries ex-ante, and to agree on a common approach and on the specification of the empirical models estimated. The outcome of such a joint effort would be a set of results that could be compared not only qualitatively but with a view on the magnitude of the estimated effects, too.

Section 2: Firm-level Data and Market Selection

The interest in entrepreneurship and processes of new firm formation has a long tradition in economic theory. The reason for this interest is obviously the importance of entrepreneurship and new firm formation (entry) in the structural adjustment of the economy. Entry is also strongly associated with the innovation process, since entry is one way to introduce a new production technology and/or a new product. Therefore, the entry and exit processes are basic driving forces underlying economic growth. These issues are indeed fundamental for economic growth policy.

Unfortunately, shortage in firm demographics data in Arab countries and its coverage enables researchers to draw concrete inferences on firm dynamics and poses an important obstacle to analyzing births and deaths of enterprises. This data shortage necessitates the need for more effort to be done on data collection and dissemination for better understanding of the within-firm growth and market dynamics.

The role of within-firm productivity growth *vs*. the productivity growth induced by the reallocation of resources from less productive to more productive businesses has been the focus of much recent research (see Olley and Pakes (1996), Griliches and Regev (1995) and Foster, Haltiwanger and Krizan (2001,2002)). The substantial churning of firms in many countries studied, along with the reallocation of labor across continuing firms, implies that workers and firms incur in significant search and other adjustment costs. As such, the efficiency of an economy in dealing with such reallocation is important not only for the productivity dynamics of the economy, but also for the dynamics of the labor market and in particular of unemployment.

Whatever the leading force driving the heterogeneity of firms, the expansion or contraction of existing units, as well as the creation and failure of firms, are likely to be influenced in different ways by policy and institutional settings in product, labor and financial markets. Moreover, the selection process (creative destruction) imposes costs on all those involved (entrepreneurs, workers, financial institutions), and these costs are likely to be influenced by policy and institutions.

Thus, firm-level dynamics appear to be crucial for the relative success of developed economies and also for the trajectories of transition and emerging economies as they develop and open up markets. More generally, knowledge of the determinants of heterogeneity across firms may contribute to the understanding of how the aggregate economy evolves and reacts to exogenous shocks.

2.1. What drives aggregate productivity growth?

In a given industry, productivity growth is the result of different combinations of productivity growth of existing firms, changes in market shares amongst them, and the entry and exit of firms to the market.

Depending on the measure of productivity (labor or TFP), within-firm productivity growth depends on changes in efficiency and the intensity with which inputs are used in production. Shifts in market shares amongst incumbents reflect inter-firm resource reallocation. These shifts affect aggregate productivity trends if, for example, highly productive firms gain market shares. The process of entry and exit of firms is another form of reallocation, which contributes to aggregate productivity growth to the extent that more productive new firms displace obsolete ones. The overall contribution of reallocation to productivity growth is generally identified with a competitive process taking place in the market, although it may also reflect changes in demand conditions and may also be an aspect of technological progress.

There may be important interactions between these components of productivity growth. For example, the entry of highly productive firms in a given market may stimulate productivity-enhancing investment by incumbents trying to preserve their market shares. Moreover, firms experiencing higher than average productivity growth are likely to gain market shares if the productivity gain is associated with upsizing, while they will lose market shares if their improvement was driven by a process of restructuring associated with downsizing.

There are a number of ways in which aggregate productivity can be decomposed into these components. One of the most frequently applied methods is decomposition, where the contribution of productivity components or factors is discerned. Following the suggestions of Ahn (2001), the aggregate productivity in a given industry can be measured by a weighted average of each firm's productivity in the sector:

$$LP_t = \sum_i \theta_{it} LP_{it}$$

Where θ_{it} is the market share of the *i*th firm, LP_{it} is the firm labor productivity. The shares are based on employment in the decomposition of labor productivity and on output in the decomposition of total factor productivity.

In line with the preferred method by Foster, Haltiwanger and Krizan (1998), the aggregate LP growth can be decomposed as follows:

$$\Delta LP_t = \sum_{Continuers} \theta_{it-k} \Delta LP_{it} + \sum_{Continuers} \Delta\theta_{it} (LP_{it-k} - LP_{t-k}) + \sum_{Continuers} \Delta\theta_{it} \Delta LP_{it} + \sum_{Entries} \theta_{it} (LP_{it} - LP_{t-k}) - \sum_{Exits} \theta_{it-k} (LP_{it-k} - LP_{t-k})$$

Where Δ denotes to change between the *k*-year interval between the first year (*t*-*k*) and the last year (*t*). LP_{t-k} is the aggregate productivity level of the industry. The contribution of the factors decomposed is interpreted as follows:

(1) The firm productivity growth weighted by initial market shares is defined as *within effect*.

(2) The second term represents the *between-firm* component that reflects changing shares, adjusted for the average productivity.

(3) The third term represents a *cross* (covariance) *effect*, that is positive when the market share growth for firms with growing labor productivity.

(4) The *entry effect* denotes the sum of differences between each firm's productivity and initial aggregate productivity, weighted by its market share.

(5) The sum of differences between every existing firm's labor productivity and initial aggregate labor productivity, weighted by its market share represent the *exit effect.*

2.2. Models of Industrial Evolution: Theoretical predictions and Empirical results

Once firms have entered the market, they operate under continuous but varying levels of exit risk. Theoretical models of industrial evolution such as the passive learning model of Jovanovic (1982) and the active learning model of Pakes and Ericson (1998) predict that small firms are more likely to exit the market than their large counterparts. These models also predict that the risk of business failure declines over time as firms acquire new competitive skills or as they fully discover their innate efficiencies. However, the business strategies literature suggests that small firms do not need to grow in size in order to survive. The argument is that small firms have the advantages of flexibility and specialization in niche markets that allow them to overcome business failures (Caves and Porter (1977) and Porter (1990)).

Most empirical studies, particularly for developed countries, find positive and statistically significant size and age effects on firm survival in line with market selection models (Bernard and Jensen (2007) and Geroski (1995)). The results are mixed for firms in developing countries. Factor elasticities estimated from production functions often do not obtain significant scale economies in manufacturing, suggesting that small firms may not be particularly at a disadvantage in most industries (Biggs *et al.* (1995) and Little *et al.* (1987)). Similarly, for micro and small enterprises in southern Africa, McPherson (1995) found no significant size effect on survival. However, Frazer (2005), Mengistae (2006) and Söderbom *et al.* (2006) show clearly that large firms stand better chances of survival.

Identifying the role of productivity has been at the center of firm survival analysis. If markets work properly, competition would purge industries of inefficient producers. Despite methodological differences in the estimation of productivity, the studies by Frazer (2005) and Söderbom *et al.* (2006) provide evidence that productivity reduces the

risk of exit significantly. In the case of Söderbom *et al.* (2006) the productivity effect is statistically significant only for small firms.

While this might be generally the case, efficiency does not seem to explain the entire survival story. For a group of five African countries, a large proportion of exiting firms closed down for non-business reasons, such as the death of the owner or opening up of better opportunities elsewhere (Liedholm, McPherson, & Chuta (1994)). As in McPherson (1995) this finding is based on a sample of micro and small enterprises only.

For Ethiopian manufacturing, Shiferaw (2007) shows that while the proportion of exiting firms increases as one goes down the productivity ranking, about a quarter of establishments in the most efficient productivity quintile have also exited the market over a period of six years.

Factor intensity is often used as an indicator of firms' choice of technology. Standard trade theory claims that capital-intensive industries in economies abundantly endowed with labor would contract or even disappear unless they are protected. However, more capital per person could enhance labor productivity and reduce the hazard of business failure. The latter is a view adopted by theories of industrial evolution that relate firm survival and growth to investment in productivity-enhancing activities (Pakes & Ericson (1998)). Firms' choice of skill intensity may also affect their prospects of success. This could in fact be more relevant than capital intensity particularly for technologically advanced products that require continuous upgrading.

The empirical evidence is also mixed in this case. Frazer (2005) finds that for Ghanaian firms capital intensity raises the risk of exit after controlling for industry fixed effects while Söderbom *et al.* (2006) find no significant effect. For US manufacturing, Bernard and Jensen (2007) show that both capital and skill intensities reduce the risk of exit.

Another dimension of firm survival relates to the structure of ownership. Economic reforms in Ethiopia and other African countries have allowed, and at times promoted, local and foreign private investment even in sectors formerly reserved only for public enterprises. In Ethiopia, the investment law has removed caps on the size of investment as well as restrictions on how many lines of business an entrepreneur can engage in. These measures bring about changes in the structure of ownership which have implications on survival. For instance, firms partly or fully owned by foreigners may survive longer because of preferential treatments by policymakers or simply because of better access to superior technology. However, one would also expect foreign firms to exit the market if the location-advantages that attracted them such as natural resources or cheap labor are eroded.

Gender is another dimension of ownership worth exploring as female entrepreneurs often face more hurdles to establish and successfully run businesses than their male counterparts (Loscocco, Robinson, Hall, & Allen (1991)). McPherson (1995) found that in two out of four African countries that he studied, female-owned small firms exhibited a higher risk of closure.

A third aspect of ownership is whether or not an establishment is part of a multi-unit firm. The latter style of organization often seems to enhance performance because of the pool of resources at the firm level such as knowledge, experience, and finance that can be shared by individual plants. For UK manufacturing, for instance, Diseny, Haskel, and Heden (2003) show that being part of a group increases the survival probability as compared to single-unit establishments. Dunne, Roberts, and Samuelson (1989) also found that establishments in multi-unit firm in the US manufacturing grow faster than single-unit firms. A recent paper by Bernard and Jensen (2007) shows that although the unconditional probability of exit is much lower for multi-unit firms, this advantage turns out to be statistically insignificant once plant level characteristics are taken into account.

Other forces that influence firm survival operate at the industry level. If an industry is on the upswing with a growing demand, survival might be easier even for inefficient firms, while a downswing might threaten even the well established firms. Ignoring inter-industry variation in output growth could therefore undermine the identification of firm level traits of survival. In theory, more competition is expected to induce productivity growth by intensifying the exit threat. Accordingly, if trade liberalization exposes industries to direct competition from imports, some producers will be forced to improve productivity or lose market shares leading eventually to closure.

Competition could also be predominant even in protected industries if the domestic market is not dominated by few players. Industries with high concentration are therefore expected to have lower risks of exit because of weak competition. A related issue is inter-industry variation in entry and exit barriers that would influence the risk of firm closure. Hopenhayn (1992) shows that high entry barriers, due to government policy or collusion among large firms, could reduce the minimum level of productivity needed to stay in the market thereby protecting incumbents. Similarly, costs associated with firm exit such as employee compensation or difficulty to recover fixed assets may delay firm closure although they may not prevent it indefinitely.

Section 3: Competition, Efficiency and Market Dynamics in Arab Countries: Two Projects, Two Books

3.1. Competition and efficiency in Four Arab Manufacturing Industries

This book provides the first critical study into competition and efficiency issues in the Arab world. Combining quantitative analysis and field surveys to assess the degree of competition, the degree of efficiency and their relationships in the manufacturing sector, this book gives a unique insight into Egypt, Jordan, Morocco and Tunisia.

Using the same methodology and data definitions across countries, the contributors assessed the state of competition, the state of efficiency and the relationship between the two in the manufacturing industries in the selected countries. They analyzed industrial market conditions and regulations affecting competition. They also estimated firm-level measures of concentration, productivity and inefficiency, explored the implications for

competition policy, described the competition-related policy instruments in force and made policy recommendations.

The contributors demonstrated that the economies of these countries are highly and increasingly specialized in few manufacturing industries, and it is argued that this situation should be a prime concern for policy makers, especially in light of the fact that competition policies are not always allowed to play their role and that, despite some progress, the industries are still highly protected from foreign competition.

The countries, except for Jordan, are highly specialized:

- More than 50% of the value added and employment depends on 3 (Morocco, Tunisia) to 5 (Egypt) sectors, out of a total of 25 in each country.
- Although their rankings differ across the three countries, the most important sectors are the same in each: apparel, food products, the chemical sector and textiles.
- There is no specific trend in the evolution of specialization across the countries.

Focusing on the three most important sectors in each country, the research shows that, in general:

- They are relatively un-exposed to foreign competition both in terms of import penetration and export exposure.
- Except for Jordan, their concentration ratios (based on domestic sales) are not high.
- Their mark-ups are very high, suggesting the existence of strong market power.
- The productivity growth rate of the sectors is very low, and sometimes even negative.

Some major conclusions reached in this study are:

- The most important sectors in the studied economies are inefficient and enjoy high market power.
- These sectors do not generally lack domestic competition, but do lack foreign competition. This lack of competition seems to be harmful to the efficiency of the sectors.
- Even in the countries in which competition laws were enacted, the lack of enforcement reflects the low degree of commitment towards the effective liberalization of the economies.

3.2. Market Dynamics and Productivity in Developing Countries

After more than two decades of economic reform in the Middle East and North Africa, economic performance is still lagging behind many regions of the world. Even in those countries that are the most advanced in implementing reforms, industries with low productivity growth and high market power continue to dominate.

Showcasing in-depth analyses from Jordan, Morocco, Tunisia, and Turkey, and with comparative data from Asia and Latin America, this book focuses on the dynamics of firm entry and exit to help explain the low productivity of the region.

The contributors addressed the following specific questions:

- What are the intensity and determinants of firms' entry and exit in the selected countries?
- What are the policy and institutional reforms that may have affected the process of entry and exit?
- What is the impact of firms' entry and exit on the manufacturing sector's productivity?
- Which policy recommendations follow from the answers to these questions?

The major conclusions reached in this study are:

- The process of accelerated economic liberalization in Jordan, Morocco, and Tunisia has not resulted in any major change of the manufacturing sector specialization. This is in line with the recent literature that found that intra-industry reallocation seems to be more important than inter-industry reallocation when discussing the effects of trade liberalization.
- Turbulence, defined as the arithmetic mean of entry and exit rates, is the highest in the Turkish manufacturing sector, where it is comparable to other emerging economies. From 2000 on, turbulence has been the lowest in Tunisia. While in Turkey and Tunisia, the main driver of "turbulence" is the entry rate, in Jordan and Morocco, the main driver is the exit rate. Finally, entry and exit rates in Jordan, Morocco, and Tunisia are much lower than in other emerging economies.
- In the selected countries entry and exit are mainly driven by small and medium sized firms. Moreover, textile-related products are those with high exit rates irrespective of the country. No specific pattern emerges for entry rates across the considered countries. However, in Morocco and Tunisia, both the highest entry and the highest exit rates concern textile- related products. Such a high turbulence could be associated with the foreseen termination of the Multi Fibers Agreement in 2005.
- At the industry level, there seems that no common pattern of correlation between entry and exit rates across countries exists. A negative correlation shows up only in Morocco. It concerns wearing apparel, one of the most important industries in the economy, which seems to be affected by a specific demand shock. In the other countries and for numerous Moroccan industries, the correlations are positive suggesting that the process of creative destruction (i.e. a supply side shock) is the main driver of entry and exit.

- Entry is higher in those industries offering some opportunities, either sales or productivity improvement. These are in general characteristics of new and growing industries. Entry is discouraged by natural (capital intensity and wage level) and strategic barriers (concentration of incumbents). Exit is lower when demand is growing, there are high sunk costs, and competition either foreign or domestic is limited. Once the control for the other determinants is done, entry rates are, in general, positively related to exit rates, lending support to the hypothesis of creative destruction in the countries.

- It seems that across the four selected countries, there is a weak support to the hypothesis that entry and exit have an effect on survivors' productivity. In contrast, the latter depends heavily on factors of production availability, especially capital and on actual competition. Both the factors of production availability and actual competition (either foreign or domestic) improve survivors' productivity.

Conclusion

One of the most important obstacles to conducing sound microeconomic research on Arab countries is the lack of published micro data both at the level of the household and firms. In some cases such data exist, but researchers are denied access. As a result, the quantity and quality of research based on micro data in and about the region is relatively scarce. Yet there is still a lot to be done and learnt in the field of firm dynamics and productivity in this part of the world.

The lack of reliable data and / or limited accessibility to individual databases, most often leads to losing sight of the contributions of the microeconometrics as a powerful and accurate tool to aid economists in designing and evaluating public policies and in testing economic theories. Several developing countries have taken advantage of such a tool, and it would be harmful for Arab countries not to do so.

Based on these considerations, this note has focused on the state of the art and empirical work on issues related to firm behavior using micro data. It has presented a synthesis of the most important predictions of the new trade theory that have attracted attention from empiricists regarding the channels through which commercial policy might influence firm performance and growth under firm heterogeneity hypothesis. It has also focused on the role of within-firm productivity growth versus the productivity growth induced by the reallocation of resources from less productive to more productive businesses as an important issue for the understanding of productivity dynamics in Arab region. Finally, the note has exposed the major results of two recent studies of competition, efficiency and market dynamics in the Arab world.

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